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Environmental Realpolitik: Joint Implementation and Climate Change

THOMAS C. HELLER*

Professor Heller's article discusses why there has been little progress after the Rio Earth Summit in developing the Framework Convention on Climate Change. He argues that, beyond the scientific uncertainties about climate change and its economic impacts, agreement on the legal structure of a comprehensive regime has been hampered by institutional factors. These include: the political discounting of damage to future populations, the diverse risks of global warming in different regions, and the distrust in many nations with market instruments, like taxes or tradable permits, that are favored by many industrial nations dependent on fossil fuels. Resolving these problems will be particularly difficult in multilateral negotiations under the auspices of the United Nations. This is due to the conflation of environmental issues with a broader, contested agenda of North-South issues. Unless this impasse is overcome in the near term, key nations, essential to a successful mitigation regime, may abandon collective solutions and invest in local adaptations to climate change. Heller argues that Joint Implementation (JI), a type of tradable permit system, can help to break this deadlock. However, investment in JI projects has been slow due to political opposition and to confusion about the nature of an international market in environmental services. The article concludes with an outline for the development of a JI market that does not require a prior multilateral consensus.

* Professor of Law, Stanford University. Senior Fellow, Stanford Institute for International Studies. The author thanks the World Business Council for Sustainable Development (WBCSD) with which he works on the International Business Action for Climate Change initiative. The views expressed in this article are the author's and not those of the WBCSD.

At the Rio Earth Summit (Rio) in 1992, the international community began constructing a global regime to deal with the risk of climate change. The task is recognized as notoriously complex and difficult.¹ The complexity arises in part from the uncertainty that surrounds the scientific understanding of climate change. It also reflects the political context of deregulation, the transition of many states from autocracy and economic controls to markets and democracy, and the heightened international economic competition in those nations whose commitment is most essential to an effective and comprehensive regime. Since Rio, these difficulties have resulted in the slow, perhaps illusory, progress toward defining the obligations of signatory parties to the Framework Convention on Climate Change (FCCC) and the nature of the legal instruments by which their commitments to mitigate the emission of greenhouse gases (GHGs) might be carried out.² Among the instruments that

1. See generally MICHAEL OPPENHEIMER & ROBERT H. BOYLE, *DEAD HEAT: THE RACE AGAINST THE GREENHOUSE EFFECT* (1990) (discussing the imperative for action to stop the trend of global warming in the face of industrialization and scientific uncertainty about the future); STEPHEN H. SCHNEIDER, *GLOBAL WARMING: ARE WE ENTERING THE GREENHOUSE CENTURY?* (1989) (noting the difficulties posed by climate change and the balancing of environmental, social, political, and economic concerns in looking for a solution); Symposium, *Energy and the Environment: Intersecting Global Issues*, 9 ARIZ. J. INT'L & COMP. L. 1, 1-281 (1992).

2. United Nations Framework Convention on Climate Change Conference of the Parties: Decisions Adopted by the First Session (Berlin), Mar. 28-Apr. 7, 1995, 34 I.L.M. 1671; United Nations Conference on Environment and Development: Framework Convention on Climate Change, May 9, 1992, 31 I.L.M. 849 [hereinafter FCCC]; see also Daniel M. Bodansky, *The Emerging Climate Change Regime*, 20 ANN. REV. ENERGY & ENV'T 425 (1995). In the Framework Convention, a limited number of developed nations (Annex I Parties) agreed to make good faith efforts to achieve some soft target, to which no legal obligations attach. This would be related to stabilization of GHG emissions at 1990 levels by the year 2000. No commitments beyond that year were assumed by any party and no targets of any form were undertaken by less developed nations. In Annex I nations, national plans to implement their soft obligations are overwhelmingly focused on voluntary compliance by their domestic emitters. No domestic tradable permit systems or taxes specifically for GHGs have been put in place. Rather, key Annex I nations have relied on existing programs like the sulfur dioxide controls of the United States' Clean Air Act of 1990 as prime sources of GHG reductions. See CLIMATE ACTION REPORT: SUBMISSION OF THE UNITED STATES OF AMERICA UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE 75-105 (1994) [hereinafter U.S. CLIMATE ACTION REPORT]; THE GOVERNMENT OF JAPAN, JAPAN'S ACTION REPORT ON CLIMATE CHANGE 75-135 (1994); EOP GROUP, INC., MEASURING UP TO THE YEAR 2000 AIM OF THE FRAMEWORK CONVENTION ON CLIMATE CHANGE: A COMPARATIVE ANALYSIS OF EIGHT SELECTED NATIONAL COMMUNICATIONS (forthcoming 1996). Similarly, as the siting of new nuclear plants has become more difficult, Japan has begun to look to international trading in GHG emissions in part because it contributes to the reduction of Chinese sulfur dioxide emissions that are upwind of Japanese forests. Moreover, some firms with extended time horizons have pushed toward self-regulation of GHG risks in order to forestall public mandatory regulation of GHG emissions. See *infra* note 51 and accompanying text.

In spite of these gains, it has become apparent that no major industrial nation will comply with its soft 2000 target. See UNITED STATES CLIMATE ACTION NETWORK & CLIMATE NETWORK EUROPE, INDEPENDENT NGO EVALUATIONS OF NATIONAL PLANS FOR CLIMATE CHANGE MITIGATION (1995). Many developed nations, including the United States, face rising demands for energy that have elicited plans for supply based

have been subjects of continuing controversy is Joint Implementation (JI). Joint Implementation (sometimes called Activities Implemented Jointly) is a clumsy and alienating way of expressing an idea that is elegant and familiar. JI is simply an application of the normal principles of international trade to the problem of greenhouse gas mitigation.

Unlike other gases such as sulfur dioxide, whose noxious effects are suffered locally and regionally depending upon where they are emitted, the world's atmosphere serves as a unitary sink for GHGs.³ Although the economic and social impacts of living in a warmer environment do relate to particular factors such as proximity to sea coasts, the degree of temperature change caused by ongoing high rates of GHG emissions is independent of where the emissions occur. In effect, the beneficial effects of reducing emissions anywhere in the world are equivalent to reducing emissions locally.

From a scientific standpoint, there is no reason to favor emissions mitigation in any particular location. To understand the simple economic logic of JI, let us imagine that there is an actor in some nation that has accepted an obligation to reduce its GHG emissions to a lower level than that nation would have produced if business as usual continued. For purposes of definition, we need not be concerned with why the actor takes on some part of the national commitment. To make sense of JI, we must only assume that the actor may legally satisfy whatever obligation is accepted by investing in one or more of a portfolio of similarly effective emissions mitigating options, with differential costs in various regions of the world. With an international market in GHG reduction services, a rational actor may make use of the theory of comparative

heavily on coal that will produce emissions growth. See Ralph Cavanagh et al., *Utilities and CO₂ Emissions: Who Bears the Risks of Future Regulation?*, *ELECTRICITY J.*, Mar. 1993, at 64, 68-71. There may even be policy changes, such as the introduction of retail wheeling in the deregulation of American energy markets, that can lead to GHG increases in the targeted period. See RALPH CAVANAGH, *NATURAL RESOURCES DEFENSE COUNCIL, THE GREAT "RETAIL WHEELING" ILLUSION—AND MORE PRODUCTIVE ENERGY FUTURES* (1994). In the face of weak multilateral commitments and weaker national implementation, the slow opening of Joint Implementation (JI) markets remains one of the few initiatives in climate change mitigation.

3. Because other pollutants such as SO₂ and NO_x do not diffuse uniformly in the atmosphere, trading in emissions rights for these gases can be more complex. See T.H. TIETENBERG, *EMISSIONS TRADING: AN EXERCISE IN REFORMING POLLUTION POLICY* 203 (1985); Robert W. Hahn & Gordon L. Hester, *Where Did All the Markets Go? An Analysis of EPA's Emissions Trading Program*, 6 *YALE J. ON REG.* 109 (1989); Marc A. Levy, *International Co-operation to Combat Acid Rain*, in *GREEN GLOBE YEARBOOK OF INTERNATIONAL CO-OPERATION ON ENVIRONMENT AND DEVELOPMENT* 59 (Helge Ole Bergesen & Georg Parnmann eds., 1995); James T.B. Tripp & Daniel J. Dudek, *Institutional Guidelines for Designing Successful Transferable Rights Programs*, 6 *YALE J. ON REG.* 369, 388-90 (1989); Carlos A. Gavilondo, *Comment, Trading Clean Air - The 1990 Acid Rain Rules: How They Will Work and Initial Responses to the Market System*, 67 *TUL. L. REV.* 749, 754-55 (1993).

advantage by purchasing the requisite amount of mitigation wherever it is least costly.⁴

To build a climate change system in which JI is a central element requires a new set of legal mechanisms which motivate, facilitate, and evaluate the quality of JI projects. What minimally makes a project a candidate for JI recognition is a demonstrable showing that invested funds have led to a lower stream of GHG emissions than would have been released in their absence. This measurable reduction may then be used to offset emissions from other emitting activities of the investor so that its net emissions comply with its legal commitment. JI possibilities may grow out of a wide range of energy, industrial, agricultural, residential, and transportation projects.⁵

Although the initial investments in, and political debate about, JI have focused on expanding forestry reserves and improving silvaculture practices to sequester GHGs in new biomass stocks, the potential for large-scale JI is far greater in the energy sector.⁶ JI projects may involve supply side activities

4. See Joaquim Oliveira-Martins et al., *Trade and the Effectiveness of Unilateral CO₂-Abatement Policies: Evidence from Green*, 19 OECD ECON. STUD. 123 (1992); see also Alan Manne & Richard Richels, *The Berlin Mandate: The Costs of Meeting Post-2000 Targets and Timetables*, ENERGY POL'Y (forthcoming 1996). It is reasonable to believe that the stock of opportunities to reduce GHG emissions at the least cost per ton will be found in the developing world. Low cost emissions mitigation in the industrial world will be constrained by low growth, commitment to existing technologies and assets, a mature energy and transportation infrastructure, and the high costs of retrofitting. In the developing world, by contrast, rapid growth will open options to install new capital stock with higher efficiency technologies, reform political practices that have distorted resource allocations, and modify inefficient business practices which have persisted because they have not been subject to the competitive forces of markets.

5. For examples of different categories of JI projects, see *World Business Council for Sustainable Development: International Business Action on Climate Change*, available in <http://www.wbcsd.climatechange.com>. Additional information on JI projects can be found through the *Edison Electric Institute International Utility Efficiency Partnerships*, available in <http://www.ji.org>.

6. Development of JI markets have been slow for a variety of reasons.

(1) The private transactional and organizational costs of adjusting to new forms of investment are substantial and may have collective goods properties. Complementary services to JI investment such as legal, insurance, and monitoring services are not yet developed. Organizational reform firms may need to enter new geographic and service markets where JI potential lies. For example, a Japanese city, which has always been a monopoly supplier of electricity in Osaka, will need to reform its internal structures and operating procedures to participate in competitive energy supply ventures in China.

(2) Public transaction costs are initially high as governments experiment with the rules by which JI projects will be certified as eligible to create valid offsets. Standards for qualified monitoring and GHG accounting protocols have yet to be fashioned. The process of developing national JI programs is clouded, but not stalled, by the uncertainty about the future of JI in the FCCC negotiations. See *infra* note 18.

(3) National rules that create incentives to invest in JI projects are yet undeveloped. In industrial nations, the likely home countries of JI investors, there are no serious taxes or environmental liabilities against which GHG offsets can be credited. Current JI activity is then motivated by voluntary and

which reduce emissions either by changing the inputs to productive processes or by increasing their efficiency. Examples of supply-side JI activities are switching fuels from coal to natural gas or improving the capacity of transmission lines that carry electricity from generators to users. Alternatively, JI may operate on the demand side through programs like financing consumer use of compact florescent lighting or the installation of mass transport, which lower the consumption of emissions-intensive products or services.⁷

The way nations decide what constitutes a qualified JI project and determine how many offsets will be credited to a JI investor pose a host of subtle strategic issues that will excite much analytical commentary and legal argument. The issues include how to define national emissions baselines against which JI-caused improvements are to be measured, how to monitor and verify that JI projects comply with their promised environmental benefits, and how to prevent nations from abandoning environmentally sound policies in order to increase the number of JI opportunities they may market

self-regulation programs, in anticipation of the enactment of limitations on GHG emissions in the future. In these circumstances, the value of GHG offsets will be uncertain and heavily discounted.

(4) In the Americas, the initial activity in JI has been focused on small scale emissions sequestration projects. Afforestation and forest conservation programs have been a subject of political controversy, attacked by developing countries as attempts by the to engage in "carbon colonialism" and prevent economic growth. Also, since GHG offsets have little positive value at present, sequestration projects are mismatched to investor needs. Energy firms in the North, the actors most likely to see JI as an important form of risk management, have few business development opportunities in the forestry sector to complement the limited offset value as a return on investment. Finally, small scale projects create higher transaction costs in a market where these costs are already substantial. See *infra* note 59. Aggregation of small projects into a more general investment instrument could mitigate this problem.

(5) JI investment in the more attractive energy sector of Asia is retarded because the energy and transportation sectors in that region are often caught up in the process of transition. Uncertainties about subsidies, privatization, and rate setting make financial returns in these key sectors excessively risky.

(6) The low value of GHG offsets at present creates analytical problems in the process of certifying JI projects as departures from business as usual. If firms are not sure that a JI project will be qualified as an offset, they become hesitant to explore the market. See *infra* notes 8 and 46.

7. See *Global Environment Facility, China: Issues and Options in Greenhouse Gas Emissions Control*, U.N. Development Programme, U.N. Doc. CPR/91/G32/A/IG/42 (1993) [hereinafter *GEF China Report*]; UNITED MEXICAN STATES & BANCO NACIONAL DE OBRAS Y SERVICIOS PUBLICOS, MEXICO: HIGH EFFICIENCY LIGHTING PILOT PROJECT (Project Document submitted to the World Bank and the Global Environment Facility, Mar. 1994).

internationally.⁸ The current problem is not resolving these issues in advance, but defining specific steps that leading nations ought to take to put this dynamic game into play.

8. JI projects must contribute to a reduction in global GHG emissions. Baselines define the initial conditions against which such improvements are to be measured. If all parties to a climate change regime were assigned caps on their national emissions, these caps would constitute the baseline above which emissions would be prohibited. In the current situation, where only a limited number of parties have assumed even soft emissions targets, qualification of offsets implies that JI projects should be additional to business as usual in order to ensure they are consistent with climate change objectives.

JI projects should be qualified as offsets if investors would not have undertaken the investment in the absence of the value added by GHG emissions reduction. If the investment would have occurred under a firm's normal business practice, there is reason to question whether an allowance to offset its emissions in the home jurisdiction should be permitted. A second aspect of JI accreditation should investigate whether the nation hosting the project has created, through positive action or inappropriate inaction, an excessive stock of potential emissions reduction that may be transferred. There is a moral hazard associated with JI in states without defined emissions allocations since the potential for attracting investment capital may tempt host governments to abandon local environmental controls, maintain subsidies or trade controls, and relax pricing reforms in order to market the induced emissions. Bilateral agreements to define a baseline for the JI host nation, or a unilateral specification of the baseline for the host by the home country as a condition of JI qualification, can serve as the functional equivalent of a missing national cap.

If national baselines, however defined, were firm, it would not be necessary to worry whether each individual JI project ensured additionality or the reduction of emissions below some expected trajectory, or to recognize offsets only when the value of GHG reductions altered a firm's investment portfolio. However, it will be difficult for host nations to agree to a surrogate baseline that depends on the action of foreign investors beyond their control. Home nations may choose to define the business as usual case or host country baseline to include not only an appropriate policy context for environmental quality, but also the expected patterns of economically justified investment. In this case, JI qualification should rely on a rule that includes both project additionality and moral hazard considerations in a composite baseline.

JI qualification standards which look to additionality or the investment value of GHG offsets are problematic in the absence of domestic incentives such as taxes, GHG emission limits, or effective self-regulation. Until GHG reductions have a positive value, it poses a conundrum for regulators like the United States Initiative on Joint Implementation or the Japan Program to place too much weight on this condition for offsets recognition. A moving standard of evaluation that interacts with GHG values may be needed to develop the JI market. In addition, hard questions about what it means for a project to be a departure from normal investment patterns intersect with the issue of what constitutes a "no regrets" project. *See infra* note 46. *See also* THOMAS C. HELLER, JOINT IMPLEMENTATION AND THE PATH TO A CLIMATE CHANGE REGIME (The Robert Shuman Centre at European University Institute, Jean Monnet Chair Paper No. 23, 1995); Naoki Matsuo, *Japanese JI Initiative*, JOINT IMPLEMENTATION Q., Fall 1995, at 4; Announcement of Groundrules for U.S. Initiative on Joint Implementation, 59 Fed. Reg. 28,442 (1994).

JI belongs to a family of economic instruments whose optimal form is a market in tradable emissions permits.⁹ If there were a clearinghouse for licenses to emit GHGs, actors producing more emissions than they were permitted would simply go into this market and buy additional emissions rights, until the market price of a permit exceeded the costs of reducing further emissions. As long as the total quantity of authorized emissions, divided among nations, is consistent with global climate change targets, tradable permits in deep and efficient international markets would yield environmental protection and a least-cost result.¹⁰

JI is usually presented by advocates of economic instruments as a way station on the road to a comprehensive regime of tradable permits, which would enable public agencies and private organizations to learn how to operate in a world of international trade in environmental services. Like any market which is incomplete and sparsely populated, JI would initially be an imperfect economic tool.¹¹ Yet, in spite of its recognized limits, JI sets forth the basic structure of a new genre of post-regulatory tools, strongly favored by industrial groups and national political authorities. The proclaimed virtue of these market instruments is that they foster decentralized decisionmaking through the use of property allocations, taxes, or subsidies. These market instruments alter the quantities or prices of goods and services implicated in the solution of collective action problems, instead of relying on centralized mandates of specific technologies or production processes as do traditional command and

9. JI is a type of economic instrument similar in purpose to a tradable permits system. In some instances, a JI project might involve no more than a purchase of carbon or other GHG offsets unrelated to the buyer's core business. For example, a North American utility, with no experience or interest in forestry, could invest in a reforestation program in Malaysia, taking the return on its capital in the form of the GHG offsets allocated by the investment agreement. In this case, the JI project would be equivalent to a purchase of a tradable offset, if such an international instrument existed. It would also be possible for the JI investor to combine its return in carbon with a standard financial return, if it so desired. In other instances, JI may involve projects that are extensions of the core business of the buyer of the offsets. If the North American utility were to invest in an Asian project aimed at improving the efficiency of transmission and distribution lines, its return could be based on the value of the offsets assigned to it, any financial return it took from the electricity sales, and potential gains in business development from extending its service market into a growing area of the world. Until political action assigns a higher positive value to reductions of GHG emissions, the latter form of JI is likely to predominate. *See supra* note 6.

10. Least cost results do not follow necessarily from permit trading if there is an uneven impact of emissions. *See* GER KLAASSEN, *TRADE OFFS IN EXCHANGE RATE TRADING FOR SULFUR EMISSIONS IN EUROPE* (1993) (report to the UN/ECE Task Force on Economic Aspects of Abatement Strategies). This is not a problem with CO₂ trading due to uniform diffusion.

11. *See* Peter Bohm, *Incomplete International Cooperation to Reduce CO₂ Emissions: Alternative Policies*, 24 J. ENVTL. ECON. & MGMT. 258 (1993); Kerry Krutilla, *Environmental Regulation in an Open Economy*, 20 J. ENVTL. ECON. & MGMT. 127 (1991).

control regulatory policies.¹² Although the standard logic of trade and the rising tide of domestic deregulation would seem to strengthen the argument for legitimating JI, this has not happened in the FCCC negotiations in the aftermath of Rio. JI and the broader issue of appropriate climate change instruments have been embroiled in a fundamental debate about the issue of the allocation among FCCC signatories of commitments to reduce GHG emissions, a debate which has stalled the multilateral negotiations. The initiative undertaken at Rio reflected a widely shared optimism about the prospects for attacking problems of a global reach, with negotiations on a global scale. Against the background of expanding international environmental law,¹³ the FCCC process was inaugurated in the afterglow of the successful Montreal Protocol on Substances that Deplete the Ozone Layer.¹⁴ Yet the first years of the FCCC regime were marked by an inability to resolve the core issues of how extensively wealthy nations must cut their GHG emissions; what commitments, if any, will be assumed by developing nations;

12. The use of the term command and control is often imprecise. Command and control policies might be defined purely as involving a governmental mandate of environmental process or product technologies, with location-specific regulation and no trading. See Maureen L. Cropper & Wallace E. Oates, *Environmental Economics: A Survey*, 30 J. ECON. LITERATURE 675, 685-87 (1992). A pure economic instrument might suggest pollution permits or environmental taxes that set the quantity or alter the price of pollution. Economic instruments leave producers and consumers with the choice of how to respond most efficiently to those changes in economic conditions, and imply the possibility of trading in open markets to comply with their obligations. It is also possible, however, to define midpoints along this continuum which combine varying degrees of flexibility and trading. See, e.g., Clean Air Act Amendments of 1990, 42 U.S.C.A. §§ 7651-7651o (showing the complex mix of mandatory regulation and limited market instruments that allow permit trading in the United States); see also Paul R. Portney, *EPA and the Evolution of Federal Regulation, in PUBLIC POLICIES FOR ENVIRONMENTAL PROTECTION* 7 (Paul R. Portney ed., 1990).

13. See generally ANTHONY D'AMATO & KIRSTEN ENGEL, *INTERNATIONAL ENVIRONMENTAL LAW ANTHOLOGY* (1996); VED P. NANDA, *INTERNATIONAL ENVIRONMENTAL LAW & POLICY* (1995); *INTERNATIONAL LAW AND GLOBAL CLIMATE CHANGE* (Robin Churchill & David Freestone eds., 1991). It is important to recall that the rapid increase in the number of international environmental agreements does not in itself mean that these laws are enforced. There is reason to question whether the laws are more formal, symbolic, or aspirational than a material restraint on environmental degradation. For an analysis of the political economy of international environment regimes, often more optimistic about the prospects for effective multilateral accord on climate change than is my argument in this essay, see generally GLOBAL ACCORD: ENVIRONMENTAL CHALLENGES AND INTERNATIONAL RESPONSES (Nazli Choucri ed., 1993); INSTITUTIONS FOR THE EARTH: SOURCES OF EFFECTIVE INTERNATIONAL ENVIRONMENTAL PROTECTION (Peter M. Haas et al. eds., 1993); LAWRENCE E. SUSSKIND, *ENVIRONMENTAL DIPLOMACY: NEGOTIATING MORE EFFECTIVE GLOBAL AGREEMENTS* (1994).

14. See Montreal Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987, 26 I.L.M. 1550 (amended 1990, 30 I.L.M. 537); RICHARD E. BENEDICK, *OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET* (1991).

and who will bear the costs of these mitigation activities.¹⁵ This blockage also raises questions about whether the underlying political and economic factors that contributed to the agreement in Montreal are so different that they explain the obstacles on the road from Rio.¹⁶

My argument is that the FCCC process has stumbled over some problems that are specific to the issue of climate change and others that are peculiar to

15. At the First Conference of the Parties to the FCCC (COP-1), held in Berlin in April 1995, agreement on a protocol legitimating JI was prevented by an unresolved debate between developed and developing countries on the nature of commitments to limit GHG emissions after the year 2000. Third World states insisted that the Annex I parties deepen their emissions reductions in the next century because they were historically the parties responsible for the climate change problem. Industrial states argued that deeper mitigation commitments would be ineffective without universal commitments because the bulk of GHG emissions growth would take place in the developing world, especially Asia. Although a number of less developed states in the Group of 77 (G-77) supported a JI protocol that would allow offsets for qualified projects, this solution was stalled within the G-77 caucus. The COP-1 compromise position was that JI would be permitted only for the purpose of study in a Pilot Period, and that, during the Pilot Period, the FCCC would not recognize any positive value for offsets in JI projects between Annex I and developing states. In effect, the Berlin Mandate was "no cap, no trade." See Mark Hertsgaard, *Global Warning*, N.Y. TIMES, Apr. 8, 1995, at 23. See also *infra* note 61.

16. The analogy between the Montreal Protocol and the effort to build a comprehensive regime in the FCCC is attractive. Both ozone depletion and climate change are problems of the global commons, require a comprehensive solution, and were motivated in good part by scientific consensus in a mobilized epistemic community. See generally 46 INT'L ORG. 1 (1992) (special issue devoted to the role of epistemic communities in international relations). The Montreal Accords, however, are distinguished by the small number of nations where ozone depleting substances were manufactured, the absence of a blocking coalition in the G-77 group because of the low economic interest in CFC consumption, the mass political visibility of the ozone hole over Antarctica, and the development of a close substitute for CFCs by DuPont. See James K. Sebenius, *Challenging Conventional Explanations of International Cooperation: Negotiation Analysis and the Case of Epistemic Communities*, 46 INT'L ORG. 323, 355-61 (1992). The availability of a close CFC substitute was critical for a number of reasons. First, it fragmented business criticism of the scientific consensus on the causes and consequences of damage to upper level ozone. Second, it reduced to manageable proportions the costs of creating a transfer fund to compensate developing nations for their economic losses of subscribing to the regime. Third, it allowed the United States to become a strong regime advocate, backed by DuPont, marshaling incentives and sanctions on behalf of regime formation. In the case of climate change, there are large numbers of self-interested parties, a formidable blocking coalition of southern states facing high opportunity costs of emissions stabilization, little agreement on the availability of low cost options for GHG mitigation that suggest compensation is practical, and little public anxiety about the long run harms threatened by climate change.

A general discussion about the competing theories in international relations that stress realpolitik, institutional factors, or the roles of epistemic communities in environmental regimes is beyond the scope of this paper. See Stephen D. Krasner, *Structural Causes and Regime Consequences: Regimes as Intervening Variables*, 36 INT'L ORG. 185 (1982); Detlef Sprinz & Tapani Vaahtoranta, *The Interest-Based Explanation of International Environmental Policy*, 48 INT'L ORG. 77 (1994). I will note that to the extent that the exercise of power, by inducement or sanction, is important to regime formation, it may be necessary to build regimes in forums where such power can be effectively deployed. Because the United Nations process of multilateral negotiations increases the potential for the formation of blocking coalitions, it may not be as apt a forum for climate change as more decentralized or multi-local bargaining. In this sense, Montreal may encourage a misplaced confidence about the prospects for mitigation of climate change through the FCCC.

the UN multilateral forum in which climate change is being addressed. My theory why deadlock has emerged, and is likely to persist, can be outlined in five points:

- (1) A nation may adopt two possible strategies to respond to climate change—mitigation and/or adaptation. The purpose of the former is to reduce the causal factors of change in the climatic system. The purpose of the latter is to restructure social and economic organization to adjust to the damages brought about by an altered climate.
- (2) Mitigation is a solution whose effectiveness depends upon the common action of many nations and requires an institutional regime to ensure this necessary international cooperation. Adaptation is a local solution which will can be adopted either by national choice or in default of a common regime.
- (3) To build a common institutional regime for mitigation demands the resolution of three problems specific to the issue of climate change:
 - (a) A number of nations, sufficiently large to make a common mitigation regime effective, must reveal their actual willingness to pay, or their actual demand to be paid so that negotiators may find a basis for a comprehensive regime. Scientific and economic uncertainty about the risks of climate change and strategic behavior in negotiations will obscure the discovery of a solution point (which would be reflected in the determination of a global limit on GHG emissions and an allocation of this cap among regime participants), especially given the differences among nations in the relative costs of mitigation and adaptation.
 - (b) A mitigation regime must include a mechanism for trade in capped emission rights (or an analogous international market in tax credits) among participants; in other words, a cap and trade system. In the absence of trade, the costs of domestic mitigation will be too high for nations that still rely on extensive and efficient fossil fuel energy systems. Accordingly, they may defect to adaptation strategies. It is one mechanism for implementing a cap and trade system. Such economic instruments, however, may have implications

for the volume of transfer payments in a climate change regime that will be resisted by developing nations.

(c) A mitigation regime will probably have to be built within a limited time period before new emission-intensive energy and transportation infrastructures are established in rapidly developing economies. The installation of a capital base, with a long useful life, may bring about enough climate change so that adaptation becomes a dominant strategy in nations with relatively low costs of adaptation.

(4) For a variety of institutional reasons, it may be that the United Nations Framework Convention on Climate Change is not an appropriate venue in which the problems of a climate change regime, which mandates broad commitment by both developing and developed nations, are likely to be solved.

(5) If the FCCC is not the best venue to agree on a mitigation regime, mitigation proponents must seek a forum more likely to allow the emergence of a solution that incorporates the necessary elements of value revelation, trade, and timeliness. JI can be reconceived as the cornerstone of an alternative, multi-local system where trading is the mechanism by which caps--national allocations of emissions quotas--are discovered through the operations of the market cap and trade system.

My ultimate goal here is to provide an understanding of why the political economy of climate change has proven so difficult and to speculate on the prospects for escaping from the current deadlock over commitments through

the multilateral diplomatic process.¹⁷ Because I am skeptical about these prospects, my sense is that, as a tactical matter, it will be necessary to reconsider the concept of JI from a less orthodox perspective. This paper attempts to show that because the direct, multilateral road to a comprehensive climate change regime is impeded, JI can provide a roundabout route to that same endpoint. Put bluntly, JI—understood as a surrogate for tradable permits --is blocked because it is assumed that the allocation of GHG emission quotas must precede trading within those caps. Since the commitments issue is unresolved in the FCCC, JI, as a trade mechanism, is inhibited.

Yet, in spite, and because of this political blockage, JI remains the one active field where market instruments for climate change are being explored. Though not fully validated by the FCCC, JI is the only game in play and, if reconceived, may provide an escape path from the deadlock over commitments

17. The COP-1 debate reflected the constitutional and cultural character of the multilateral negotiating forum. Voting rules are based on consensus and make likely the formation of blocking coalitions. In addition, the diplomatic dialogue about climate change is often embedded in a wider heuristic by which North and South argue over who is responsible for causing and ameliorating global difficulties. The G-77 bloc has taken the position that JI or other forms of international trading are unacceptable because they are not consistent with the equities of global environmental politics. They argue that JI would constitute an evasion of historical responsibilities in the North, that emissions must be eliminated at home, and that no limits may be imposed on compensatory economic growth in the South. While research points out that, because of population and energy use dynamics, the total cumulated past emissions of industrial nations are not very different from the prospective emissions in the developing world, the debate over climate change cannot easily be separated from a much broader diplomatic agenda in which North-South discord is endemic. See Adam Rose & Brandt Stevens, *Equity Aspects of the Marketable Permits Approach to Global Warming Policy* 15-16 (Nov. 1993) (unpublished manuscript, on file with author).

Wherever one's political sympathies lie in this global debate, the enmeshing of JI within it hinders a more pragmatic understanding of the JI problem. Because the costs of retrofitting existing energy and transportation infrastructure to lower emissions may be a very high percentage of total replacement costs, Annex I nations which rely heavily on fossil fuels are unlikely to reduce emissions substantially before the present capital base is largely depreciated. Because much of this base was installed in recent decades, infrastructure in the North is often at a midpoint of its normal forty to fifty year life cycle. Consequently, the present costs of deep mitigation below current emissions levels in Annex I nations may be high relative to the costs of adapting to climate change. Alternatively, infrastructure installation in much of Asia, where the large growth in emissions is forecast, is at the beginning of an investment cycle. If JI can be used, in part, to push new Asian energy and transport systems toward the leading edge of emissions mitigation, it may be possible to reduce the risks of climate change during the coming years when the northern capital base is obsolescing. The next major round of investment in Annex I nations should be far more carbon neutral because of technology innovation. The JI problem, as *realpolitik*, is to deal with the current, limited dilemma by creating foreign investment flows into the South where the mitigation opportunities exist. See *infra* notes 61-66 and accompanying text on the implications of this timing question for regime formation.

in the multilateral negotiations.¹⁸ If we reimagine JI as an active market, in which nations bid to attract foreign investment in environmentally sound projects, it may be possible to induce them to take on mitigation commitments individually through individual bargains. In other words, an operative JI market would become less the implementing instrument of the climate change regime than the means by which it is constituted.

Although this introductory essay only focuses on propositions one through three above, I will close with a sketch of my argument, which asserts the importance of contemplating a period during which the development of a comprehensive regime can only be approached through the careful exercise of environmental realpolitik. This is because of the low probability that multilateral diplomacy will break free of the political deadlock in which it is enmeshed (proposition four). Specifically, JI must become the instrument by which a limited number of willing nations inaugurate a cap and trade system as the centerpiece of an alternate road to climate change—a road which can detour around stalled diplomatic politics (proposition five).

A detailed discussion of possible operative rules and institutions under which a multi-local system may evolve toward an effective and comprehensive regime is beyond the scope of this article. At this point, my purpose is to persuade the interested community that the current problem is not what the optimal substance of a climate change regime should be, but in which forum

18. My thesis is that the development of JI markets should proceed in less centralized forums outside the FCCC to escape two problems engendered by multilateral negotiations. The first is the easy coalition of blocking groups due to large numbers and the international law norm that seeks consensus among autonomous nation-state actors. See James K. Sebenius, *Negotiation Arithmetic: Adding and Subtracting Issues and Parties*, 37 INT'L ORG. 281 (1983). The second is the political interest in bargaining in the climate change arena to establish reputation effects that are aimed at other issues on the broad diplomatic agenda. In less centralized forums, the capacity of nations to mobilize incentives and sanctions will differ, as will their ability to monitor compliance. A dynamic game that converges toward a common regime for climate change may begin with a limited number of players, although a relatively early credible commitment to participate by the United States and China, as the largest emitters whose behavior will be emulated by others, seems essential for success.

In this perspective, the failure at the Conference of the Parties in Berlin to agree on a protocol authorizing the international recognition of JI offsets is not debilitating. Businesses who may invest in JI projects care not about FCCC recognition, but whether their national governments agree that the firms have met whatever obligations those governments have devolved to them.

National recognition for JI offsets may be initiated in either of two ways. A key subset of wealthy, GHG emitter nations may coordinate a multi-local cap and trade system outside the FCCC, or they may sign among themselves a limited protocol within the FCCC forum that depends on the consent of the whole G-77 bloc. In either case, they would agree to certify offsets to their national investors in qualified JI projects and extract the JI question from the unresolved issues of commitments. The success of the project would depend on the ability of the market thus created to attract non-signatories to trade environmental quality for investment capital. See *infra* note 61.

and by what process this issue should be addressed. Further, I submit that my contrarian argument—that international relations may sometimes better proceed through indirection than along more straightforward pathways—should be seriously considered.

I. THE CONDITIONS OF NEGOTIATION: APPROACHING THE CHINA TRAP

Climate change is not a replay of the story of “Chicken Little,” who spread the news of impending catastrophe across the barnyard when an acorn fell upon his head. The sky will not fall if projected warming occurs, even at the upper end of the forecasted 1.5 to 5 degrees Celsius range of temperature increases.¹⁹ Four degrees centigrade is about the average annual temperature difference between New York and Miami, and people survive in both places. There are two fundamental problems with climate change: first, the disparate impact of warming and its associated climatic effects in various regions of the globe; and second, the disparate capacity of the varied social systems in those regions to adapt to those climatic effects.

It is highly probable that there will be important differences in the relative cost of mitigating climate change as opposed to adapting to life in a warmer environment. This variability in the relative local costs of mitigation and adaptation may alter the incentives of nations to choose which of these two strategies should be dominant. Calculating the mitigation costs of installing and operating emissions-reducing technologies, of lowering the rate of economic growth, and, for wealthier nations, of contributing transfer payments to the international regime may be problematic.²⁰ However, estimates of adaptation costs may be at least as hazardous. Beyond the direct costs that a

19. See David Schimel et al., *CO₂ and the Carbon Cycle*, in CLIMATE CHANGE 1994: RADIATIVE FORCING OF CLIMATE CHANGE AND AN EVALUATION OF THE IPCC IS92 EMISSION SCENARIOS 35 (J.T. Houghton et al. eds., 1995); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC SECOND ASSESSMENT SYNTHESIS OF SCIENTIFIC-TECHNICAL INFORMATION RELEVANT TO INTERPRETING ARTICLE 2 OF THE UN FRAMEWORK CONVENTION ON CLIMATE CHANGE 1995 (forthcoming 1996) (manuscript at 2-4, 14-17, on file with the IPCC Working Group II Technical Support Unit, Washington, D.C.) [hereinafter IPCC SYNTHESIS].

20. See generally WILLIAM R. CLINE, THE ECONOMICS OF GLOBAL WARMING (1992) (especially chs. 3-5); Andrew Dean & Peter Hoeller, *Costs of Reducing CO₂ Emissions: Evidence from Six Global Models*, 19 OECD ECON. STUD. 15 (1992); W. DAVID MONTGOMERY, CHARLES RIVER ASSOCIATES, INC., THE COST OF CONTROLLING CARBON DIOXIDE EMISSIONS: CONSENSUS AND CONTRAST IN ECONOMIC MODELS (1992) (final report prepared for the American Petroleum Institute). For IPCC criteria for evaluation of costs and benefits associated with climate change, see INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC WORKING GROUP III SECOND ASSESSMENT REPORT, SUMMARY FOR POLICYMAKERS 5-11 (1995).

nation, confronted with a changing climate, may incur in protecting itself against threatened damages or the loss of valued ecologies, there also may be substantial indirect adaptation costs.²¹ These may result from the spillover effects of regionally variable damages, caused by warming, that are reflected in certain social phenomena like conflicts over scarce environmental resources or population displacements.²² Finally, there is at least the possibility that investments in mitigation and adaptation strategies are not complementary but exclusive and that nations may see the choice between them as all or nothing.²³ Unless these nations are persuaded that mitigation can be cost-effective, they will opt for adaptation and undercut the feasibility of a multilateral regime.

Although the relative cost comparisons between mitigation and adaptation-based strategies may be hard to determine, the qualitative distinction between them is sharp. Mitigation is a pure public good for any target level of emissions reduction since it does not matter where mitigation occurs. Therefore, the usual collective action problems associated with public goods demand that strategies aimed at mitigation create institutions able to coordinate and monitor a cooperative regime. Adaptation, by contrast, is local in character and requires no commitment to common solutions. Each nation need only pursue its own least costly options for adjusting to its prospective damages.

The greatest risk in negotiating a mitigation regime may lie with asymmetrical information, about the location of the thresholds of adaptation costs, which lead developing nations to underestimate the willingness of the wealthy to pursue local solutions, rather than pay the price the South demands to participate in a common system.²⁴ While the impacts and costs of response to climate change may be locally specific,²⁵ it is very plausible that the bulk of the damages, to which affordable adaptation is limited, will occur in Third

21. For a discussion of mitigation costs, see IPCC SYNTHESIS, *supra* note 19, at 17-22; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IPCC WORKING GROUP II, SUMMARY FOR POLICYMAKERS: IMPACTS, ADAPTATION AND MITIGATION OPTIONS 11-18 (1995) [hereinafter IPCC OPTIONS]. For a discussion of direct adaptation costs, see IPCC SYNTHESIS, *supra* note 19, at 7-11, 24; INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE: THE IPCC RESPONSE STRATEGIES at xliii-xlvi (1991) [hereinafter IPCC RESPONSE]. See also U.S. CLIMATE ACTION REPORT, *supra* note 2, 109-32; Paul E. Waggoner, *Now, Think of Adaptation*, 9 ARIZ. J. INT'L & COMP. L. 137; A. Dan Tarlock, *Now, Think Again About Adaptation*, 9 ARIZ. J. INT'L & COMP. L. 169; Jesse H. Ausubel, *A Second Look at the Impacts of Climate Change*, 79 AM. SCI. 210 (1991). See CLINE, *supra* note 20, at 295-96.

22. See *infra* note 60.

23. See *infra* notes 61-66 and accompanying text.

24. See *infra* note 59 and accompanying text.

25. See Robert Mendelsohn et al., *The Impact of Global Warming on Agriculture: A Ricardian Analysis*, 84 AM. ECON. REV. 753 (1994).

World nations.²⁶ This would imply that the relative value of mitigation is higher for developing states than for the industrialized bloc. It might also imply that the point at which adaptation supplants mitigation as the dominant climate change strategy will be lower in the North than the South.

Mitigation is a public good, which requires that a sufficient number of nations cooperate to yield a common mitigation solution. Demands by the South that the North pay a total cost in domestic emissions reductions, plus international transfers, which exceed their adaptation costs, may cause northern nations to defect from the climate change regime. Powerful northern actors such as the United States or the European Union are not easily subjected to sanctions if they refuse to subscribe to an international regime. Accordingly, any defection by a strong northern actor will radically increase the burden of transfers to be shared by those wealthy states that might otherwise subscribe. In turn, this burden increase will feed back on the tipping point or adaptation thresholds of those states otherwise disposed to commitment. This can lead to a spiral of defections that will end in universal default.

The political difficulty for a nation faced with a choice between commitment to a common mitigation regime or default into investment in adaptation stems from three sources. First, the success of a multiparty agreement between nations, with diverse environmental values and different histories of GHG emission, depends on the ability of negotiators to evaluate accurately the willingness of parties to pay for or supply mitigation services. Potential solution points for an international regime are clouded, however, by the political ambiguity that surrounds an issue characterized by substantial scientific uncertainty.

Climate change is afflicted by a lack of clarity about the probabilities of temperature increases, the valuation and distribution of their associated damages, and the relative costs of alternative strategies, such as mitigation or

26. See AS CLIMATE CHANGES: INTERNATIONAL IMPACTS AND IMPLICATIONS (Kenneth E. Strzepek & Joel B. Smith eds., 1995) (especially executive summary and chapters on complex river basins, global sea level rise, and integrated impacts on Egypt); see also *GEF China Report*, *supra* note 7, at 10-15. Left out of most studies would be regional impacts of indirect effects of climate change. For example, if climate change damage to agricultural productivity, combined with growing populations, the loss of prime agricultural lands to urbanization, and dietary shifts toward meat consumption that accompany rising wealth led to substantial grain imports in China, the impact on world agricultural stocks and prices would very likely be most severe in Africa and other Third World poor states unable to bid effectively in global agricultural markets. See VACLAV SMIL, CHINA'S ENVIRONMENTAL CRISIS: AN INQUIRY INTO THE LIMITS OF NATIONAL DEVELOPMENT 138-87 (1993).

adaptation. Although there is a substantial consensus among atmospheric scientists about the overall direction and range of probable effects on the climate from greenhouse gas emissions, debate about the interaction between the biosphere and the geosphere, and about the local and regional effects of systemic change will continue.²⁷ The economic logic of risk management would support some form of current international action as insurance against the more extreme consequences of climate change. However, political actors always resist imposing sure and immediate costs on identifiable voting interests in order to secure long-term and less certain gains for diffuse, often unborn, beneficiaries. This reluctance, when combined with the wide variation of values attached to climate change risks and the strategic incentives to mask actual values, inhibits multilateral agreement upon a common regime.

Second, the timing of the constitution of a climate change regime is not propitious. The Earth Summit coincided with a widespread, often justified, disenchantment in the domestic politics of many nations in both the industrial and developing world with the orthodox instruments of government regulation, including the regulation of the environment. The struggle over climate change has been marked by a demand for two simultaneous innovations in the standard practices of international regimes: new commitments and new instruments. Making one substantial change in political direction is always hard; two changes often spawn coalitions of interests, which have different reasons for opposition that are impossible to overcome.

The third source of political difficulty of nations forced to choose between mitigation or adaptation is time constraints in the early stages of regime definition which may lead to irreversible or path-dependent effects on later options; deferred action becomes the choice by default. The combined effect of these independent sources of political debility makes the resolution of the climate change problem, by means of internationally coordinated mitigation, problematic.

27. For the IPCC consensus, see IPCC SYNTHESIS, *supra* note 19. For views that dissent from the IPCC consensus, see Patrick J. Michaels & David E. Stooksbury, *The Failure of the Popular Vision of Global Warming*, 9 ARIZ. J. COMP. & INT'L L. 53.

II. VALUE REVELATION: UNCERTAINTY AND THE PRICE OF MITIGATION

The attempt to decide national policy positions on climate change remains a contested subject for all major signatories of the FCCC, especially in those advanced and developing countries that depend on fossil fuels. The uncertainties clouding these debates derive from the compounded effects of near speculative predictions about a linked cycle of scientific and economic processes. To estimate GHG emissions trajectories, one begins with forecasts of demographic and economic growth, placing emphasis on urbanization and energy use rates. Growth indicators can be translated into net emissions output through more specific variables, such as sectoral shifts from agriculture and industry to services, qualitative evolution of diet from grains to meat, the evolution of transport and land use patterns, and the projected composition of fuels consumed in energy generation. Net emissions factor into climate impacts through complex global atmospheric models. These models require a careful definition of the interactions of the atmosphere and the biological and oceanographic systems that function as sinks for greenhouse gasses.²⁸

The recent work of the Intergovernmental Panel on Climate Change (IPCC) is testimony to the rapid advances in modelling competence and to the distance still to be covered.²⁹ The latest sets of global simulation results, corrected for the cooling effects caused by the eruption of Mount Pinotubo and the emission of sulphate aerosols from fossil fuel burning, track empirical records on temperature directions and magnitudes increasingly well. However, because national strategies toward climate change are determined by local and regional impacts of climate variation, the formidable task of reducing effective scale of climate models to conform to political scale still lies ahead of the scientific community.³⁰

28. See David S. Schimel, *Terrestrial Ecosystems and the Carbon Cycle*, 1 GLOBAL CHANGE BIOLOGY 77 (1995); David Schimel & Elizabeth Sulzman, *Variability in the Earth Climate System: Decadal and Longer Timescales*, 33 REVIEWS OF GEOPHYSICS 873 (Supp. 1995); U.S. CONGRESS, OFFICE OF TECHNOLOGY & ASSESSMENT, CLIMATE TREATIES AND MODELS: ISSUES IN THE INTERNATIONAL MANAGEMENT OF CLIMATE CHANGE (1994).

29. See IPCC SYNTHESIS, *supra* note 19, at 5-6; Elizabeth W. Sulzman et al., *Modeling Human-Induced Climatic Change: A Summary for Environmental Managers*, 19 ENVTL. MGMT. 197 (1995).

30. See, e.g., THE RAINS MODEL OF ACIDIFICATION: SCIENCE AND STRATEGIES IN EUROPE (Joseph Alcamo et al. eds., 1990); Leen Hordijk, *Use of the RAINS Model in Acid Rain Negotiations in Europe*, 25 ENVTL. SCI. & TECH. 596 (1991); Gregory R. Carmichael & Richard L. Arndt, *Atoms Module: Long Range Transport and Deposition of Sulfur in Asia*, in RAINS-ASIA: AN ASSESSMENT MODEL FOR AIR POLLUTION IN ASIA at V-1 (Wes Foell et al. eds., 1995); see also Sulzman et al., *supra* note 29, at 203-05.

If policymakers had reasonable confidence in the growth-emissions-climate nexus, their next step in planning a climate change strategy would be to relate climate forecasts to economic costs and benefits. The principal interactions usually identified are connected to agriculture (net CO₂ fertilization, rainfall shifts, frost days), sea level changes, human health (heat related illness, spread of tropical disease vectors), hyper-storm and other high climate variance events, biodiversity loss, disruption of particular ecologies such as wetlands and deltas, and feedback effects on energy demand.³¹ The economic costs of climate change would vary widely depending on local exposure to these multiple risks, with some nations experiencing net positive benefits that would make them reluctant adherents to a mitigation regime.³² In some instances, regional climatic factors may affect the damages associated with global phenomena. For example, while the national assessment of sea level changes will depend on the proportions of the population and on economic activity in low-lying areas, the local health costs of warming could be reduced by the countervailing effects of regional aerosol concentrations not subject to long-range transport.

The ordinal relation between adaptation and mitigation strategies is a crucial question in the negotiation of a climate change regime. The point at which it becomes cheaper to adapt than to mitigate is the ceiling to what wealthy nations--expected to reduce their historic rates of emission and pay compensation for cooperative action by developing states--are willing to pay for a common solution. Yet, pervasive uncertainty about the reliability of growth-emissions-climate models obscures the cardinal values attached to these alternatives. As noted above, the cost of adaptation may hinge on variables as hard to estimate as the value of losses in biodiversity or the marginal cost of increased border and police vigilance against illegal migration, due to environmental damages. There are, however, equally complex political and conceptual problems associated with working out the economics of mitigation.

First, recent studies have indicated that costs can be driven down deeply by global trade in mitigation services.³³ Whether trading will be incorporated and implemented efficiently in the FCCC regime is now a matter of political speculation.³⁴ Second, technological optimism or suspicion, each a recurring

31. See IPCC OPTIONS, *supra* note 21, at 4-11.

32. See Mendelsohn et al., *supra* note 25.

33. See sources cited *supra* note 4.

34. See *infra* notes 41-61 and accompanying text.

theme of modern history, can affect attitudes about the viability of a mitigation strategy.³⁵ Developments in technologies which reduce or avoid emissions may lower the slope of projected cost curves for mitigation if they can be substituted for current processes in time to limit irreversible damages. However, past predictions about the rate of cost-effective technological change in the energy sector for alternative fuels like solar, fusion, or biomass have been notoriously unreliable. Governments may now attach scant credibility to claims that they ought to invest heavily in mitigation, rather than pursue adaptation, while awaiting expected technical breakthroughs.³⁶

A third source of uncertainty about the translation of scientific and economic data into policy arises from the interdependence between actors that characterizes collective action problems. Since mitigation is a joint product, the decisions of any one nation to commit to a mitigation regime must rest on its expectations about the complementary behavior of other states. If national actors believe that key prospective regime partners either cannot commit to mitigation or will not be able to enforce and implement the obligations they undertake, the resulting expectations that the system will be ineffective in forestalling climate change will cause them to retreat toward local adaptation.

Earlier, I noted the fragile politics of commitments to mitigation, which require national authorities to balance current expenditures against future benefits. Political constitutions and voting systems vary widely in the incentives and disincentives which affect decision makers' responses to short-run or longer-term interests. If a nation expects that its partners in a collective effort, like mitigation, have short time horizons that will lead them to favor a regime which loads mitigation costs into the period just beyond the next national election or change in administration, they may have small reason to believe the next generation of politicians will have incentives to comply with commitments entered into by their predecessors. In such a game, defections from mitigation will become attractive.

Similarly, states may have varied capabilities to implement mitigation commitments. Nations such as the United States, with a strong tradition of popular democracy and large numbers of domestic actors, whose behavior must be coordinated, may be adjudged less reliable collective-action partners than Western European or East Asian polities, with an established tradition of

35. See generally HOWARD P. SEGAL, *TECHNOLOGICAL UTOPIANISM IN AMERICAN CULTURE* (1985).

36. Technological innovations which are said to reduce simultaneously economic and environmental costs are discussed in conjunction with the wider debate about "no regrets" options. See *infra* notes 40-47 and accompanying text.

corporatist politics.³⁷ These states may be better able to enter into and police climate commitments because they can agree on the appropriate division of obligations among, and monitor the behavior of, small numbers of oligopolistic firms grouped by sectors in intermediary organizations. Alternative queries about the will and ability to adhere to multilateral agreements may obscure forecasts about the behavior of Third World states like China, whose participation is essential for successful mitigation. Nations in transition from authoritarian politics and centrally planned economies can reacquire legitimacy by achieving high economic growth rates that supply the basic needs of expanding populations.³⁸ At the same time, these nations labor under the questionable effectiveness of nascent legal institutions needed to assure compliance with collective commitments.³⁹ Again, since the value of mitigation expenditures depends on the coordinated activity of regime partners, an absence of their credible commitment to, or capacity for compliance with, mitigation regime obligations will push policy makers in states with relatively low adaptation costs toward the local solutions they can better manage.

A final argument on behalf of a mitigation regime, that may bear greater political weight, asserts that mitigation is a "no regrets" strategy. The concept of no regrets suggests that there is an extensive portfolio of GHG emissions-reducing options, in production and consumption, unexploited by normal market operations, which can be installed and operated at no net cost to their

37. On the political effects of differences in institutional culture within the European Union, see Susana Aguilar, *Corporatist and Statist Designs in Environmental Policy: The Contrasting Roles of Germany and Spain in the European Union Scenario*, 2 ENVTL. POL. 223 (1993); Adrienne Heritier, "Leaders" and "Laggards" in European Clean Air Policy, in CONVERGENCE OR DIVERSITY? INTERNATIONALIZATION AND ECONOMIC POLICY RESPONSE (Brigitte Unger & Frans van Waarden eds., 1995).

38. See WORLD BANK, *THE EAST ASIAN MIRACLE: ECONOMIC GROWTH AND PUBLIC POLICY* 157-67 (1993).

39. See Stanley B. Lubman & Gregory C. Wajnowski, *International Commercial Dispute Resolution in China: A Practical Assessment*, 4 AM. REV. OF INT'L ARB. 107 (1993).

users.⁴⁰ The idea of a no regrets option could be meaningful in both a social and a private context. In a collective sense, no regrets could signal that total societal wealth could be increased while emissions fall, with a consequent improvement in public welfare. For example, if current subsidies to fossil fuels were reduced so that the use of lower emissions energy sources were increased, standard economics would call that a no regrets result.⁴¹

This would not mean that all parties involved in this substitution would be happy about the situation. Fossil fuel users and producers could find their wealth reduced. However, the gains to taxpayers who had financed the subsidy, to consumers who had suffered the deadweight loss of the subsidy-induced resource misallocation, and to those who value the reduced environmental damages should more than offset these losses. Since, in theory, compensation to the losing groups is possible, and since legal economic analysis does not accord a protected right or reliance interest in subsidies, the restoration of appropriate prices in the market causes neither compensable harm nor regret.

The meaning of "no regrets" becomes more complicated as soon as we acknowledge that the policies in place have been enacted, and will be defended, by entrenched political forces. Real transactional costs of political mobilization are associated with displacing embedded policies. Moreover, the lack of legal recognition of reliance interests alters the forum where the battle occurs, more than it alters the intensity of the fight.

40. The logic underlying the "no regrets" argument suggests that either society as a whole or a private organization can alter its behavior so that environmental quality and wealth will both increase. If a stock of no regrets solutions exists, the policy problem is to find out what hinders their discovery and remove the bottleneck. Most no regrets examples seem to turn on three types of bottleneck. First, organizational problems may prevent actors from seeing or implementing no regrets solutions. In public organizations, the problem may be political capture that leads to inefficient subsidies. In private firms, it may be having janitorial staffs with no incentives to install efficient lighting in charge of maintenance decisions. A second cause of no regrets bottlenecks are information costs. For example, firms may be unaware because of cognitive limitations or routines that are used to scan investment possibilities that further R&D investment will yield substitutes for environmentally damaging products or processes and a market return on their investment. If forced to make this investment, resistance will evaporate once the bottleneck is broken. Third, imperfect capital markets may impede investment in activities which are known to be efficient in the medium or long run. Admitting the possibility of global welfare gains at the societal or organizational level, no regrets options present, but do not solve, the problems of how high the costs of removing bottlenecks are, who will pay them, and whether and how social or intra-organizational interests whose welfare may decline in order to win the global benefit will be compensated.

41. The reduction of energy subsidies, without more, would make a substantial contribution to GHG mitigation. See Jean-Marc Burniaux et al., *The Effect of Existing Distortions in Energy Markets on the Costs of Policies to Reduce CO₂ Emissions: Evidence from Green*, 19 ORGANISATION ECON. CO-OPERATION & DEV. 141 (1992).

The number of “no regrets” options in the private sector is still more elusive. We might note that firms have not installed efficient insulation systems and consumers have not made use of low energy lighting, even though it is clear that these technologies would be cheaper and less GHG emissions-intensive than their present practices.⁴² It is often asserted that firms do not invest appropriately in new technologies or in the development of products that yield a competitive rate of return and are ecologically more efficient. If this behavior is attributable to a lack of information about these opportunities, or to imperfections in capital markets that might hinder front-end heavy investments, then the meaning of the term “no regrets,” where there are positive costs of information search or financial reform, is problematic.

The Porter hypothesis suggests that firms systematically underestimate the private marginal rate of substitution between technology innovation and other investments.⁴³ Therefore, they fail to exploit profit opportunities that would offset the environmental costs associated with these processes or products. This argument has been popular among Green groups opposed to the incorporation of economic instruments and international trading in the FCCC. These groups favor more orthodox national regulation through mandated

42. See OFFICE OF AIR & RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY, *THE CLIMATE IS RIGHT FOR ACTION: VOLUNTARY PROGRAMS TO REDUCE GREENHOUSE GAS EMISSIONS* (1992).

43. MICHAEL E. PORTER, *THE COMPETITIVE ADVANTAGE OF NATIONS* 648-49 (1990); see also Michael E. Porter, *America's Green Strategy*, 264 SCI. AM. 168 (1991).

standards or processes, because such regulation will force firms to discover these negative cost solutions to climate change.⁴⁴

In spite of the allure of the “no regrets” analysis for mitigation proponents, there are a variety of reasons why the concept may not alleviate the pervasive uncertainties about climate change that push nations toward default into adaptation. First, orthodox economists will always be skeptical about the likelihood that firms in competitive markets will actually make such mistakes about the relative value of investment in innovation.⁴⁵

Second, when we take into account the transaction costs of reorganizing information and capital markets, or reforming political errors like subsidies and protection, it becomes apparent that the term “no regrets” may have scant operative meaning beyond its technical economic sense. While pure models in neo-classical economics may have long abstracted from this class of costs, to businessmen and politicians, transaction costs are indistinguishable from other costs. To an industrialist being asked to change long-standing behavior related to the products, processes, markets, or organizational forms in which he invests, information about options or lobbying to prevent reform are simply

44. See CLIMATE NETWORK EUROPE, JOINT IMPLEMENTATION FROM A EUROPEAN NGO PERSPECTIVE 7-10 (1994). Because of the increasing importance in the multilateral process of the parallel NGO forums that now complement UN conferences on women, population, and environment, the opposition of Green groups to economic instruments may be magnified in the FCCC forum. The odd coalition, which opposed JI at COP-I, was composed of Greens, the oil producing states, and the more confrontational developing states.

It is ironic that relatively more militant Green groups, who often advocate environmentalism as the best way to an anti-materialist style of life, rely on technological optimism to decry the need for offset trading. In part, the Green view that there is a large reserve of no regrets solutions to be discovered may reflect a residue of left anti-capitalism that sees the private economy as inefficient, and even likely to engage in conspiracies to forestall eco-efficient innovation. In another vein, Green reluctance to favor economic instruments and open JI markets may be rooted in a distrust of the political processes that would oversee GHG offset trading. In developing nations, where JI projects would be located, the lure of investment funds may lead to both moral hazard threats to domestic environmental controls and the marketing of poor quality or badly monitored JI opportunities. In developed nations, a race to the bottom may arise in which JI offsets are recognized by national authorities that do not represent additional environmental quality as much as they lower the costs for national firms of complying with GHG obligations. The political debilities of governments in host and home countries, as well as the need for coordination between host states to avoid competitive dynamics, are real problems for JI. See *infra* note 59. Many of these questions, however, are not specific to JI or other economic instruments alone. If politics in the South or the North are captive to corporate interests, banning economic instruments and markets in favor of national command and control regulation would not seem the appropriate palliative.

45. If a divergence between the social rate of return to innovation and the private rate of return exists, then there is scope for policy intervention on standard classical grounds.

costs of doing business. Policy that ignores these costs may be both ineffective and resisted.⁴⁶

Third, if we believe that the allocative failures exposed by no regrets options represent collective goods problems to be solved through government action, it is not clear that either climate change, or other environmental regulation, is the right instrument to be used. For example, if capital markets were systematically unable to finance cost effective consumer purchases, economists would argue that it is better to correct the market failure by

46. The existence of "no regrets" options poses conceptual issues for the qualification of JI offsets. In theory, a no regrets project should be undertaken by a rational and informed public or private actor. For private JI investments, no regrets projects should have an internal rate of return at or above the market (or hurdle) rate and should occur in the absence of any additional return derived from the value of GHG offsets. Since JI qualification might be conditioned on the change in expected investor behavior induced by offset values, a no regrets project could be rejected by national authorities of the investor's home nation on the grounds that it should have occurred through normal business practice. No regrets projects could be said to be inframarginal to the host country baseline (assigned by the home country in the JI process) because the host country should have reached the post-project level of emissions mitigation without any need for added JI stimulation. See discussion *supra* note 8.

There are two problems with this policy. First, at present, the positive value of GHG offsets is heavily discounted. Consequently, investors will seek out no regrets projects because of their competitive financial and business development returns. For this reason, they will make up a disproportionate share of the early JI universe and will call for special attention. Second, the most notable fact about no regrets options is that, in spite of their purportedly competitive rates of return, some bottleneck prevents their realization. See *supra* note 40. In a sense, it seems insufficient to deny offsets, without more, to projects that should have occurred, when they do not.

One way beyond this puzzle is to focus more carefully on the nature of the bottlenecks that underlie the no regrets question. If a host nation has created the bottleneck (e.g. a subsidy or an inefficient capital markets regulation), or should be charged with its removal (e.g. supplying information that has a public goods character about market opportunities), then it would be logical to include these expectations about host country policy in the national baseline and deny JI qualification. On the other hand, the bottleneck might exist because of public goods the host nation is not expected to supply or because of cognitive or organizational structures at the level of the firm. In this case, it might make sense to grant offset recognition to provide incentives for investors to break free from the routines that have limited their business as usual behavior.

JI qualification of no regrets projects with cognitive or organizational bottlenecks might involve an evolving standard for a given firm or industrial sector. Consider a Japanese utility, historically a monopoly provider of electricity in a regulated geographic area, which has never been an active exporter of energy services in the international market. It would require a substantial investment in learning and organizational reform for the utility to pursue energy provision in China. The costs of learning and restructuring, associated with a new service in an unfamiliar and risky market, are capital investments to be paid at the outset of the innovative line of activity. Offset credits may help move the firm from one path of organization development to another. Once so moved, no further incentives to continue along the new path will be necessary or appropriate. According to this reasoning, offset recognition of no regrets projects should focus on the analysis of the transaction costs of going beyond routinized business practice. It would define business as usual, less on orthodox marginalist assumptions, than on the non-linear principles now being explored by evolutionary economics. See generally RICHARD R. NELSON & SIDNEY G. WINTER, *AN EVOLUTIONARY THEORY OF ECONOMIC CHANGE* (1982); Richard R. Nelson, *Recent Evolutionary Theorizing About Economic Change*, 33 J. ECON. LITERATURE 48 (1995).

intervening in the organization of banking directly, than by intervening through a program of demand side management emissions offsets.⁴⁷

Finally, it is not intuitive that pervasive market failures, which lead to the underdevelopment of new technologies, necessarily would mean that there are more of such failures associated with mitigation than with adaptation technologies. Even if no regrets opportunities in the private sector are plentiful and militate in favor of mitigation, this should not mean that no regrets ought to be a weapon against international emissions trading. As with other market failures, the probability of substantial misallocations is greater in the Third World, where markets have long been less competitive than they have been in advanced industrial nations. If no regrets options exist, they are more likely to be found in the South than in the North. Trading in emissions offsets to break through the information and other barriers that prevent their exploration in the normal course of business, should not be ruled out *a priori*.

In sum, uncertainties about the thresholds at which various nations will decide that their costs of mitigation exceed their local costs of adaptation make estimates of the actual demand and supply prices for mitigation problematic. In turn, these uncertainties, magnified by the strategic behavior nations may adopt to take advantage of their presence, may render unproductive multilateral negotiations, whose search for mitigation-based solutions depends on realistic estimates of these values. A perceived risk of failure to resolve the constitutional problems of a mitigation regime results in the emergence of adaptation as the dominant default strategy for climate change.

III. DUAL SHIFTS: DEREGULATION AND ECONOMIC INSTRUMENTS

The politics of climate change are complicated not only by the confusion that surrounds the basic choice between mitigation or adaptation, but by alternative institutional models, through which mitigation solutions might be pursued. The first of these might be called a regulation/transfer fund model (called in the FCCC a financial mechanism).⁴⁸ It represents the familiar standard in the design of international mechanisms for managing collective

47. If consumers could borrow to finance efficient lighting with larger front-end costs, it would not be necessary for utilities to distribute subsidized light bulbs whose emissions savings might qualify as JI projects. As long as electricity prices reflect a social cost charge for GHG emissions, consumers in this new financial framework would have the ability to choose whether or not they preferred mitigation.

48. FCCC, *supra* note 2, arts. 11-12; Montreal Protocol Parties: Adjustments and Amendments to the Montreal Protocol on Substances that Deplete the Ozone Layer, June 29, 1990, 30 I.L.M. 537, art. 10.

action problems.⁴⁹ This model would function through a multilateral acceptance of a global cap on net GHG emissions and a commitment by nations party to the regime to limit their national emissions to quotas, whose sum would equal the overall target. Each party would then define a national regulatory structure to ensure compliance with its national cap. The parties would either be compensated from, or contribute to, some sort of international fund, composed of public monies and linked to the climate change regime. The allocation formula by which national quotas would be set and the measure of each party's distribution from, or contribution to, the fund would be politically determined.

A second category of the regime would rely principally on economic instruments, like tradable permits or taxes, which, in the main, constitute a departure from orthodox international practice. Like the regulation/transfer fund scenario, the typical starting point for an economic instruments model assumes global agreement on an optimal tax, or global cap, on GHG emissions and an allocation among nations party to the regime of these obligations. Unlike the regulation/transfer fund model, however, the forms of compliance and the volume of transfers would be determined more through private actions in an international environmental goods and services market rather than through political rule. Such a departure demands that climate change proponents confront a dual disjunction that always poses political difficulties.

Instituting a costly set of commitments to reduce GHG emissions, largely for the sake of future generations, is not an easy task. In addition, the conflicts associated with the advocacy of relatively untraditional legal instruments make the job of discovering and maintaining a winning coalition still harder. Reformers generally do well to avoid campaigns which combine two disjunctive issues that do not have overlapping constituencies. Yet, in the case

49. Regulation/transfer fund models are also important in regional environmental politics. The accession of Mediterranean nations like Spain and Portugal to the stricter environmental standards of the European Community was compensated by transfers from Brussels through the structural funds mechanism. See Aguilar, *supra* note 37; Gary Marks, *Structural Policy in the European Community*, in EURO-POLITICS 191 (Alberta M. Sbragia ed., 1992). A similar instrument may be described in the North American Free Trade Agreement with regard to increased environmental standards in Mexico and a special border fund to defray added costs. See Jeffery Atik, *Environmental Standards Within NAFTA: Difference by Design and the Retreat from Harmonization*, 3 IND. J. GLOBAL LEGAL STUD. 81 (1995). The failure to include a similar "acidification fund" to help poorer East European states comply with obligations under the 1885 and 1994 Sulfur Protocols of the European Convention on Long Range Transboundary Air Pollution has been blamed for non-compliance in these areas. See Levy, *supra* note 3, at 65-66 (citing Johan Sliggers & Ger Klaassen, Cost Sharing for the Abatement of Acidification in Europe: The Missing Link in the Sulphur Protocol (1993) (paper prepared for the Working Group on Strategies, Executive Body for the Convention on Long Range Transboundary Air Pollution)).

of climate change, the linkage of commitments and instruments may no longer be escapable.

The period around the end of the Cold War has been marked by an unprecedented interest in establishing unencumbered markets and the virtues of competition. This interest has moved toward the reconstitution of the internal governance structures of many nations. One line of reform in domestic systems experiments with the replacement of public monopolies, as suppliers of social goods, by distributing vouchers for private services or by fostering competition between public agencies and private firms.

A second market-oriented innovation is the substitution for standard setting or best practice regulation of economic instruments, including social cost taxes or property rights. In these cases, the state sets either the price of factors external to unregulated markets (taxes), or the quantity of a collective harm allowed (quotas or permits). The state then allows the market to decide how to minimize resource costs.⁵⁰ Although these initiatives have been largely concentrated at the domestic level, the same anti-regulatory logic applies to existing and prospective international regimes. To all but ideological purists, it is clear that in particular situations, including the presence of common property resources, markets alone are not able to allocate resources optimally. Recognizing the exposed infirmities of orthodox instruments of regulation offers no way out of the dilemmas of internalizing social costs and benefits. Rather, the force of the argument for economic instruments lies in the belief that the costs associated with bureaucratic organization, as the primary tool for environmental management, can be reduced by means of periodic, but limited, public interventions. These public interventions structure incentives so that rational private actors are induced to pursue market-correcting behaviors.

Pressures on governments to build a climate change regime that relies on economic instruments come from the theoretical faith and recent deregulatory experience of key domestic constituencies in the business and economics communities. The position of business interests toward climate change, an ongoing concern of the process of institution-building inaugurated at Rio, is politically complex. In some mythical world, producers would prefer to continue consuming environmental services free of charge. The strategic behavior of capital will frequently aim to protect this first best option and, in

50. For the theory of economic instruments and bibliography to the broad economic literature, see Cropper & Oates, *supra* note 12, at 678-85. For an applied view of these choices within a different policy tradition, see generally CENTRE FOR EUROPEAN POLICY STUDIES, ECONOMIC INSTRUMENTS IN EC ENVIRONMENTAL POLICY (1993).

denying the need for any collective action, act to disguise preferences among its second best collective action solutions. A growing segment of the business community, however has recognized that treating the environment as a free production good is no longer a realistic or desirable goal. Faced with a necessary choice between traditional regulatory mechanisms and economic instruments, the advantages of the latter, for organizations whose expertise is least cost production, are apparent.⁵¹

Economists, on the other hand, are far less hesitant in describing the shape of their ideal environmental regime.⁵² The profession shares a wide consensus that encourages tradable permits, or pollution taxes, because regimes founded upon these instruments are most amenable to a design that mirrors the orthodox compendium of economic desiderata such as:

- (1) reliance on deep markets with low costs of search and exchange and secure compensation for the exchange of legally acknowledged property rights;
- (2) recognition that collective action problems are real, but best approached and solved through a minimal introduction of specialized bureaucracies that develop independent agency interests and produce systematic distortions of resource allocations;
- (3) commitment to deregulated forms of public intervention that approach collective action problems by giving private actors price incentives, which lead them to use least cost options for market correction and tend to reduce political opposition to the enactment and implementation of allocative policies;

51. In this vein, during the preparation for the Earth Summit, the World Business Council For Sustainable Development (WBCSD), published *Changing Course* which proposed an agenda for collaboration between the business community and public and non-profit actors concerned with the global environment. STEPHAN SCHMIDHEINY, BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT, *CHANGING COURSE: A GLOBAL BUSINESS PERSPECTIVE ON DEVELOPMENT AND THE ENVIRONMENT* (1992). The WBCSD recognized that the successful design and implementation of the fundamental social institutions of developed societies, from a modern telecommunications infrastructure to social security, have grown from a cooperative relation between government and the leading edge of business. An inability to forge a common commitment to new policy initiatives shared between empowered elements of the public and private sectors has been the usual hallmark of failures to adapt to the challenges of modernity. Second, *Changing Course* asserted that better functioning institutions of advanced political economies were managed by means of economic incentives rather than bureaucratic regulation. See *id.*; see also ROB GRAY ET AL., *ACCOUNTING FOR THE ENVIRONMENT* (1993).

52. See Cropper & Oates, *supra* note 12, at 687-97.

(4) low cost monitoring of the ways in which resources are actually employed to verify compliance with contractual and financial obligations assumed in market transactions. These monitoring strategies should rely, wherever possible, on the use of incentives, such that those affected by these transactions have private interests (such as employment possibilities or reputation effects) in complying with legal obligations;

(5) decentralized systems that are able to learn and retain flexibility in a context of substantial uncertainty and risk;

(6) comprehensive regimes (inclusive markets and policies) so that economic actors are not induced to substitute actions that escape the reach of the system. These induced behaviors are less desirable to private actors and do little to lessen the public problem which the regime was intended to ameliorate.

For other groups interested in the process of creating a climate change regime, the level of comfort with, and attraction to, tradable permits or social cost taxes is generally lower. These actors are often drawn from political practice or communities like law or ethics, with a strong normative orientation in their professional canon. Accordingly, they both distrust the loss of administrative control and object to the historical injustice they see as the consequences of shifting from a regulation/transfer fund to an economic instruments model for GHG mitigation.

This reluctance to ride the new wave in public policy design can be traced to the political and economic differences in the nature and extent of the environmental obligations imposed by the alternative regime forms. These differences can be highlighted if we contrast a tradable permits model with national regulatory controls and a complementary multinational fund, which is the competing institutional order now reflected in the FCCC. As discussed above, the normal vision of either the regulation/transfer model or the tradable permits model assumes that a global cap on emissions has been negotiated along with a formula, by which nations participating in the regime allocate the global target among themselves. In the regulatory/fund scenario, the cost to a signatory state will be the sum of its domestic marginal cost of reducing emissions to its target amount, and the amount it must contribute to, or receive from, the multilateral fund. These costs would, in turn, be functions of the

particular national and international rules created to structure the allocation caps and the financial mechanism.

In a classical national system, signatory states would mandate best available practice standards, or other specific control technologies and processes, to ensure compliance with the national quota. The net cost of financial transfers would vary with the political decision procedures and voting rules by which contributions to, and distributions from, a multilateral fund are administered.⁵³ By contrast a full tradable permits system would allow each participating state to meet its emissions quota through the use of a comprehensive trading system. This system would divide up the national allocation of emission rights among domestic public and private actors and allow them to choose how best to comply with this limitation at the least possible cost.⁵⁴ National costs of compliance would be the outcome of private mitigation decisions. To the extent that international trading of emissions quotas took place, there would be an automatic transfer of resources from actors buying relief from obligations, to actors selling such services. The size

53. See IPCC RESPONSE, *supra* note 21, at 249-55; see also IAN A. BOWLES & GLENN T. PRICKETT, REFRAMING THE GREEN WINDOW: AN ANALYSIS OF THE GEF PILOT PHASE APPROACH TO BIODIVERSITY AND GLOBAL WARMING AND RECOMMENDATIONS FOR THE OPERATIONAL PHASE 27-34 (1994); IRVING M. MINTZER, IMPLEMENTING THE FRAMEWORK CONVENTION ON CLIMATE CHANGE: INCREMENTAL COSTS AND THE ROLE OF GEF 3-6 (Global Environment Facility Working Paper No. 4, 1993); DENNIS ANDERSON & ROBERT H. WILLIAMS, THE COST-EFFECTIVENESS OF GEF PROJECTS (Global Environment Facility Working Paper No. 6, 1993).

54. An example of a full tradable permits system is the American implementation of the Montreal Protocol. National (diminishing) caps on the production and consumption of CFCs and halons were allocated among United States producers and importers of the controlled substances. Trading in these emissions rights is permitted at both the domestic and international levels. Montreal Protocol on Substances that Deplete the Ozone Layer, *supra* note 14, art. 2; Henry A. Waxman, *Overview and Critique: An Overview of the Clean Air Act Amendments of 1990*, 21 ENVTL. L. 1721, 1797-1807. It would also be possible to combine different economic instruments in a single regime. International rights to emit, themselves tradable, might be domestically implemented by an appropriate tax, with or without offset credits for international action. A creditable carbon tax as a domestic tool for GHG controls has been debated recently in Norway as one possible mode of JI development. See Torleif Haugland et al., *A Review and Comparison of CO₂ Taxes in the Nordic Countries*, in ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, CLIMATE CHANGE: DESIGNING A PRACTICAL TAX SYSTEM 25 (1992).

and distribution of these transfers between nations would be dependent on the market price of the environmental services contracted.⁵⁵

Presented as polar alternatives, the principal axis of divergence between the classical regulation/transfer and economic instruments models is their differential reliance on political and economic rules in approaching collective action issues. Given a global cap and a formula to allocate the global target among regime participants, the tradable permits system substitutes economic for political choice in two ways. First, the selection of mitigation strategies is private and international rather than public and national. Second, the amount of international fund transfers is set by the market through contracts conditioned on the production of mitigating activities, rather than by political judgments about the amounts to be transferred and the circumstances which define the context in which transfers will occur.

Yet, it would be a mistake to believe that this movement from politics toward economics is more than a redistribution of power over collective action problems. Politics will continue to be important in part because elements drawn from pure regulatory or market models can be combined in various patterns that rearrange the boundary between the political and economic domains. For example, the community of nations may embrace a multilateral regime that proscribes international trading and mandates a transfer fund. Individual parties to the regime may adopt a domestic system of tradable permits. Alternatively, the global regime may create a financial instrument whose voting rules give nations who are net contributors to the fund a veto over resource transfers not directly tied to improved environmental quality.

55. In theory the same effect could be achieved through an international system of nationally variable taxes or emissions charges on greenhouse gases. See Gunnar S. Eskeland, A Presumptive Pigovian Tax: Complementing Regulation to Mimic an Emissions Fee (Dec. 1993) (paper presented at Conference on Market Approaches to Environmental Protection, Center for Economic Policy Research, Stanford University, on file with author); Olivier Godard, *Taxes*, in ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, INTERNATIONAL ECONOMIC INSTRUMENTS AND CLIMATE CHANGE (1993). The transfer element would come through the international pattern of collection of tax revenues after emissions locations decisions were made in a comprehensive global market. In practice, because of asymmetries in knowledge about the relative values of environmental and economic damages, and because of differences in administrative costs, either taxes or permits may be more efficient in particular situations. See Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477 (1974). Taxes alter the cost of emissions, but do not fix their quantity. Reliance on emissions taxes may pose a problem in jurisdictions where there is a traditional reliance on energy or fuel taxes. If nations adjust other taxes on these activities downward to offset a global carbon or GHG tax, the net effect on quantity of emissions can be ambiguous. Quantity caps avoid this dilemma. On the experience with national level carbon taxes, see generally ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, CLIMATE CHANGE: DESIGNING A PRACTICAL TAX SYSTEM (1992).

The conditions attached to these transfers may be viewed by recipient nations as manifestations of economic power that compromise their political sovereignty. Still more fundamentally, even in a regime which relies heavily on tradable permits, there is a need for political choice to allocate the emissions rights and liabilities that set the market in motion and to coordinate an effective contracting system. Consequently, the normative argument for economic instruments is less a wholesale substitution of economic choice rules for political decisions than a shift toward an enlarged domain of the economic.

Political choice underlies a mitigation regime based on tradable permits and international markets because the overall cost of participation in the regime for any nation is contingent on the depth of its commitment to limit GHG emissions and the formula by which it acquires its stock of emissions rights. Other things being equal, the marginal costs of compliance would grow as a nation deepened its commitment to mitigate net GHG emissions. This would be true even though trade would allow nations with deep commitments to compare the cost of reducing net emissions within their own jurisdiction to the cost of purchasing the requisite number of offsets on the international market. Since there are many competing possible formulae that could vastly alter the allocation of permits that different nations receive, the price of mitigation and the volume of income transfers associated with economic instruments would ultimately depend on the political decisions that establish the commitment targets and allocation rules.

For example, if tradable permits were assigned to nations by reference to their national populations at a chosen date, the resulting allocation would permit large emissions growth in the Third World and induce a correspondingly larger transfer from less populated, wealthier states with obligations to reduce their historical emissions levels.⁵⁶ By contrast, if the political choice were to allocate permits in order to grandfather existing per capita emissions levels, emissions-intensive development in the Third World would be curtailed and concomitant transfers from current emitters would be minimized. Obviously, there are many possible variables and combinations of variables with which to allocate allowances that would alter the prospective

56. See SCOTT BARRETT, ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, CONVENTION ON CLIMATE CHANGE: ECONOMIC ASPECTS OF NEGOTIATIONS (1992); Adam Rose & Brandt Stevens, *The Efficiency and Equity of Marketable Permits for CO₂ Emissions*, 15 RESOURCE & ENERGY ECON. 117 (1993); Peter Sturm, *The Efficiency of Greenhouse Gas Emission Abatement and International Equity* (June 1995) (unpublished manuscript, on file with the School of Applied and International Economics, Massey University).

balance of costs and transfers posed by these simple options.⁵⁷ To the extent, however, that establishing some cap or allocation rule is the condition precedent to a regime incorporating emissions rights, the conflicting politics of environment and economic growth are buried in the core of the system's genesis.

Linking the independently contestable politics of commitments and instruments may have a detrimental impact on the success of multilateral negotiations. For any state or private organization assigned rights and liabilities for GHG emissions, its mitigation costs are a function of the direct costs incurred in reducing domestic emissions and any transfers it makes buying further rights to emit. The maximum cost that industrial nations would be willing to pay for mitigation is an empirical question. To establish an effective mitigation regime, this amount must include transfers to compensate developing nations for the net economic damage caused by their accession to the regime. This damage would reflect the difference between the growth foregone, the incremental costs of emissions-reducing measures undertaken to comply with their commitments and the local environmental costs avoided in those developing nations. In theory, simulation exercises indicate that with some allocation rules such a range of gains from trade may exist.⁵⁸

In practice, each nation will judge the viability of its participation in any prospective regime by evaluating the particular global emissions caps and allocation rules that define the commitments to which it must adhere and determining the total costs it must assume. Since estimates of total costs will depend on both commitments and available instruments for compliance,

57. Leading proposals for the political rules by which to constitute a global market in which economic instruments may be efficiently traded include: Jean Charles Hourcade & Richard Baron, *Tradeable Permits*, in ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, INTERNATIONAL ECONOMIC INSTRUMENTS AND CLIMATE CHANGE 11 (1993); Tom Tietenberg & David G. Victor, *Possible Administrative Structures and Procedures*, in UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT, COMBATING GLOBAL WARMING: POSSIBLE RULES, REGULATIONS AND ADMINISTRATIVE ARRANGEMENTS FOR A GLOBAL MARKET IN CO₂ EMISSION ENTITLEMENTS 1 (1994); Richard L. Sandor et al., *Model Rules and Regulations for a Global CO₂ Emissions Credit Market*, in *id.* at 61; SCOTT BARRETT, THE STRATEGY OF JOINT IMPLEMENTATION IN THE FRAMEWORK CONVENTION ON CLIMATE CHANGE (1995); HANS-JOCHEN LUHMANN ET AL., WUPPERTAL INSTITUTE, MAKING JOINT IMPLEMENTATION OPERATIONAL: SOLUTIONS FOR SOME TECHNICAL AND OPERATIONAL PROBLEMS OF JI IN THE FOSSIL FUEL POWER SECTOR (1995); Richard L. Sandor & Frank T. Joshua, Building a Global CO₂ Emissions Trading System: The UNCTAD Initiative (Sept. 1995) (paper presented at the Wall Street Journal Europe/Handelsblatt Conference, *International Energy Markets*, in Vienna, on file with author). For an outline of the complex agenda of political action needed to implement an effective JI regime based on an alternative trade and cap strategy, see *infra* part V.

58. See Rose & Stevens, *supra* note 17.

nations considering subscription to a climate change regime must be able to forecast the particular pattern of rules and the associated costs they will be facing. In the absence of a close correspondence between national preferences on commitments and instruments, consensus on any single set of regime rules is less likely. Nations that agree on the goal of an international regime may disagree on the question of how to get there. States that concur on the need for a specific level of GHG mitigation may have strong and opposing beliefs about

the efficacy and equity of alternative regulatory techniques.⁵⁹ A lack of

59. The preference of the multilateral community for the regulation/transfer model is rooted in distinct, but convergent themes of diplomatic culture. First, expert regulation is the hallmark of the nation-state. In nineteenth century Europe, where modern diplomacy matured, bureaucratic states legitimated themselves primarily by their technical competence in defining and administering the well-being (education, health, labor markets, and social insurance) of their domestic populations. Diplomacy internalized these norms of state action into the principles of nation states as sovereign actors that now dominate international law. In effect, regulation is the expression and proof of national autonomy, and the prime justification for the concept of noninterference that underlies diplomatic practice. Regulation is also reflected in the cognitive approaches of UN agencies which are prominent in the environmental field. For example, climate change research often takes the form of country studies, with sophisticated exercises of central planning for national energy development. See UNITED NATIONS ENVIRONMENT PROGRAMME COLLABORATING CENTRE ON ENERGY AND ENVIRONMENT, UNEP GREENHOUSE GAS ABATEMENT COSTING STUDIES (1994); CARBON EMISSIONS CONTROL STRATEGIES: CASE STUDIES IN INTERNATIONAL COOPERATION (William U. Chandler ed., 1990). While I do not contest the skill of these reports, I want to point out that the ideal of extensive regulation, though contested by the emergent emphasis on markets in many polities, may remain at its zenith in the international culture of diplomacy. See M.S. ANDERSON, *THE RISE OF MODERN DIPLOMACY 1450-1919*, at 103-49 (1993).

Second, the concept of a transfer fund coheres more with the defining characteristics of multilateral diplomacy than do transfers effected through market transactions. The debate over historical responsibility for the asymmetry between rich and poor nations has been an organizing heuristic for international politics. The South has often suggested that past exploitation by the North ought to be expressed in some form of reparations. Transfers would have the character of reparations only if they were unconditional. Accordingly, transfers like those in JI, which are limited to investments in environmental quality, would fail this test. On the other hand, it is possible that transfers deposited by the North in a multilateral fund, might be less restricted in their uses. The degree to which conditions are actually attached to the disbursement of transfers will depend on the voting rules by which the financial mechanism operates. In addition, the concept of a transfer fund implies that the contributions to it, whether in cash or technology, come from public sources. The financial relations are state to state. Again, this position reifies the diplomatic norm that states are the relevant actors in international systems. To act through a political fund is to reinforce the power of national states and, thereby, the diplomatic and international bureaus who constitute and staff the consequent regimes.

The proclivity of the diplomatic community to build regulation/transfer institutions reflects the natural tendency of any organization to reproduce its internal constitution. In the case of climate change, however, it creates a kind of shadow play that obscures the possibility of solving the current impasse. Multilateral negotiations seem to chase ghosts of centralized regulation, reparations, and nonexistent public stocks of money and technologies for transfer instead of working in the reality of market-based instruments, conditionality, and the need to mobilize private resources. The shadow play of transfers spills over into the JI market, as well. Since the concept of JI has been introduced to developing nations and NGOs in the context of FCCC diplomacy, they have frequently understood it through the familiar cognitive frame of multilateral aid. The evaluation of aid projects reflects political principles that are often at odds with business criteria for project evaluation. The bulk of JI proposals are small scale, without financial return or business development prospects, and lacking any realistic evaluation of political risk. This may be appropriate in a culture of public transfers or grants. It has little appeal to investors concerned with infrastructure development. If the shadow play is endemic to the multilateral diplomatic forum because it is genetically embedded in its cognitive field, then relocating the constitution of a climate change regime in a less restricted forum should be considered.

Beyond the shadow play, the preference for regulatory, rather than market-based, regimes is also a product of the voting rules and political practices of the FCCC. The recognition in that forum of the primacy of national sovereignty and the practice of decision by consensus shifts relative power to actors in the South where familiarity with and confidence in market instruments may be weakest. Developing states argue that

correlation between the politics of the ends and means may lead to the fragmentation of potentially winning coalitions for any specific proposed climate change regime. This would reduce the probability that multilateral negotiations will yield a theoretically available bargain.

The current contest over the appropriate form of public policy for correcting market failures may also alter the likelihood that key actors will opt for adaptation as a default strategy rather than commit to a mitigation regime. We assume that rational nations seek a portfolio of actions that minimize their total cost of response to climate change. The cost of adaptation will set a threshold beyond which a nation or organization would be unwilling to pay more in aggregate cost of transfer payments and domestic compliance associated with mitigation. In other words, if the cost of mitigation strategies is a well-constructed portfolio of direct measures to mitigate net emissions and purchases of additional emissions rights, a nation will opt out of a mitigation regime at the point where it becomes cheaper to live with higher temperatures. At that point, it will invest in all of the behavioral adaptations that are efficient in the warmer climate.

Consequently, if a nation faces a steep cost curve for mitigating its net emissions to a proposed commitment level, and if there are restrictions on its ability to reduce these costs through the use of market instruments, adaptation rather than mitigation will be more likely to dominate its climate change strategy. Political disputes about the form of regulation affect the capacity of nations to predict the total cost of mitigating climate change. These disputes push nations with a low adaptation threshold away from subscription and toward a mitigation regime. This observation recognizes that huge

J1 markets would result in the sale of the best mitigation opportunities (low hanging fruit) at low prices to foreign investors. They suggest that the South would not be able to defend its own interests in complex J1 deals. See HELLER, *supra* note 8, at 36-44. In as much as developing states are active in a variety of other investment markets and insist on their sovereign capacity to manage other stocks of depletable assets (like oil), I wonder if these arguments against markets should be interpreted as bargaining tactics over the price to be paid by northern nations for a mitigation regime. If, however, the advocacy of regulation is a tactic, rather than a norm of diplomatic culture, then the successful opposition at COP-1 to J1 may signal an overestimation of the North's willingness to pay for mitigation. In this case, the multilateral forum may contribute in a different way to a bargaining impasse. Because of the practice of bloc voting in international negotiations over regimes, the costs of organizing a cartel have already been paid. The Southern bloc will be tempted to seek a monopoly return for its supply of mitigation services. To the extent that pervasive uncertainty leads the cartel to underestimate the cost at which Northern nations may switch to adaptation, potential solutions to the negotiation may be lost. Again, this would counsel opening a competing climate change forum in which other expressions of demand and supply prices may be explored.

uncertainties are attached to the idea of adaptation costs.⁶⁰ The ultimate choice between mitigation and adaptation strategies may be unaffected by the incremental costs of negotiating a mitigation regime, that arise from disagreement over the better model of public policy through which mitigation

60. As noted above, these calculations might turn on speculative estimates about the costs of insulating nations of immigration from nations of emigration in a world where flooding, desertification, and broadened ranges of epidemic disease cause widespread population displacements. Even more uncertainty in these guesses arises from the fact that it is the marginal costs of environmental security that are the relevant measure of adaptation costs. For example, the added costs of border protection may be low in the North given the other potential causes of social and economic instability in many regions where the impacts of climate change are likely to be relatively severe. In Europe and America, recent reductions in immigration and asylum flows and reinforced policing of borders may already signal the onset of a policy commitment to adaptation at home rather than to mitigating in the Third World the causes of social disorder that provokes migration. See Thomas Heller, *The Common Foreign and Security Policy*, in THE TREATY ON EUROPEAN UNION: SUGGESTIONS FOR REVISION (T.M.C. Asser Institute ed., forthcoming 1996).

ought to be pursued. My argument is only directional, and it points in the direction of default.⁶¹

IV. THE CHINA TRAP: TIME WINDOWS AND THE VIABILITY OF MITIGATION

I have argued that there is a high risk that complexity in the politics of establishing a mitigation regime may lead northern nations to fall back to adaptation to climate change as a default strategy. I have attributed this risk to problems associated with revealing uncertain demand and supply values for

61. Although logic suggests that the issue of instruments should be divorced from the issue of commitments because a regime should favor minimizing the costs of implementing whatever commitments are made, this argument has not yet prevailed in climate change negotiations. To the contrary, discussions on JI, the only economic instrument under current FCCC consideration, were deadlocked at the April 1995 First Conference of the Parties to the FCCC (COP-1) in Berlin because JI advocates could not unbundle it from the stalled commitments debate.

It might have been argued at COP-1 that JI should be rejected as a climate change mechanism because it is only an imperfect proxy for a comprehensive tradable permits regime and, as an incomplete market instrument, will lead to price distortions and resource misallocations. See Bohm, *supra* note 11. These distortions are often referred to as "leakage" in the sense that the GHG savings generated by one project are offset (or leak from the system) by increases in GHG emissions due to price changes or resource displacements caused by or allowed in the incomplete market. For definitions of leakage, see Office of Policy Planning & Program Evaluation, U.S. Dep't of Energy, Cross-cutting Institutional Issues: Options Identification Paper for the EPA Act Section 1605 Voluntary Reporting Program (Oct. 25, 1993) (unpublished manuscript, on file with U.S. Department of Energy).

Leakage will present a problem in developing nations that do not now have national obligations to reduce emissions under the FCCC. Because low cost opportunities for emissions reductions through JI projects are likely to occur in these developing nations, they may be tempted to relax domestic environmental policies to create more emissions whose reductions may be marketed internationally. For example, a nation like China may be tempted to move away from its stated goal of reducing coal subsidies, motivating a continuing misallocation among fuel sources toward coal based electricity generation. In turn, Australian suppliers of clean coal technologies might seek JI certification in Australia for investments in reducing the emissions from new coal fired Chinese plants. The reductions brought about by the JI investment would be additional to what would have otherwise occurred in China only if the business as usual case, or baseline against which improvement is measured, did not assume the elimination of coal subsidies.

Leakage and the incentives problems posed by moral hazards are problems which must be solved in order to sustain a politically viable and environmentally sound JI regime. This is feasible with careful design. JI was not, however, distinguished on technical grounds from other economic instruments and has not been legitimated in the FCCC because there emerged no dominant coalition of parties who backed any particular package of instruments and commitments.

OECD nations might sign a JI protocol among themselves, avoiding the veto of the Group of 77 nations who opposed its adoption in Berlin because of their disagreements with the North over commitments and financial transfers. In this case, the ongoing disagreements over whether commitments must be assumed by all parties to the FCCC and the size and character of the financial instrument would be enacted in a forum outside the FCCC negotiations. The unbundling of JI from the commitments deadlock would open an indirect path to obtaining commitments through their decentralized negotiation in a competitive market. The conditions under which this alternative scenario could unfold are briefly sketched in concluding points 11-15. See *infra* part V, points 11-15.

mitigation, and with the coupling of the negotiations over mitigation commitments and new economic instruments like JI. In this section, I wish to suggest that the choice between adaptation and mitigation strategies may also have a time dimension, that adds further hazard to the constitution of a multilateral regime. Even positing that there was a negotiating consensus on a hypothetical future target for GHG emissions (e.g., stabilized global GHG emissions at 1990 levels by the year 2050), we may still imagine that the mitigation schedule might develop along one of several possible time paths.

The international community could act to change the partial derivative of GHG emissions in the short term, or to plan for a much larger reduction later, when more information about scientific and economic effects may be known.⁶² The deferral of mitigation action, however, may tip the dominant response strategy toward adaptation, especially for key industrial nations which face relatively low damage from global warming. In other words, if path dependencies are associated with the actions taken in emissions-intensive sectors, like energy and transportation in fast-growing, large economies like China, enough warming may occur to cause some nations to take local actions to protect themselves against the effects of this change. In such a case, nations with a low adaptation threshold must commit to a mitigation regime before the behaviors that initiate path-dependent development occur. If they do not commit in time, their defection will push the global system into an adaptive equilibrium. The logic of this contingent scenario is outlined below.

Although policy analysis may decide that the absolute costs of mitigation are less than adaptation, it remains possible that the most economical mitigation options may only be available within restricted time windows. Unless a sufficiently large number of parties to the climate change regime decide for mitigation within this time window, the receding horizon of low-

62. Because it is the cumulative GHG concentrations that produce climate effects, it is possible in theory to subtract the necessary quantity of GHG emissions at any time in the build-up process. Advocates of mitigation have presented this problem as a choice between smaller current investments or larger future costs. Some recent studies have gone further and argued that the better policy for climate change is to defer current action in favor of more scientific research and technological innovation. See W. David Montgomery, *Developing a Framework for Short- and Long-Run Decisions on Climate Change Policies*, in AN ECONOMIC PERSPECTIVE ON CLIMATE CHANGE POLICIES 15 (Charles E. Walker et al., American Council for Capital Formation, eds., 1996); Jae Edmonds & Marshall Wise, *Stabilizing Atmospheric CO₂: Rethinking the Emissions Problem*, in *id.* at 75. The "China Trap" hypothesis would suggest that each of these views is too sanguine. If deferred action means that some nations cross a tipping point between mitigation and adaptation, then there is more at stake than cheap or expensive mitigation. Similarly, if current emissions growth is associated with path dependent investment, then the volume of emissions to be managed is not independent of the timing of commitment to a climate change regime.

cost projects may lead to an inversely creasing preference for adaptation. Consider the path dependent trajectory of what might be called the "China Trap."

In considering this scenario, assume first that China's GHG emissions will increase from its installation of an energy-transportation infrastructure with a useful life of forty to fifty years.⁶³ The costs of retrofitting an installed base of private and public capital built on coal technologies and the heavy use of trucks and autos can be, as experience in the United States would suggest, prohibitively high. Second, assume that global change models indicate that China's additional emissions from its newly installed base will produce a warming level "X" unless China adopts, and is able to enforce, domestic regulations to internalize the predicted environmental costs of its emissions. Third, facing unavoidable warming level X, assume that it becomes economically rational for a wealthy northern state to invest in a policy response "Y" to adapt to the damages threatened by its climate change.

Fourth, assume that adaptation investment Y is lumpy, in the sense that once the investment has been made, it will manage damages over a wider range of temperature change than the level X which induced the investment. For example, once a sea wall is constructed, or an agricultural production pattern reconfigured, the incremental costs imposed by further warming over a defined range might be inconsequential.

Finally, note that once the adaptation expenditure has been made, prior investments aimed at mitigation will be rendered inutile. As long as actors are forced by warming level X to do Y, and Y is effective as a climate change response within the entire temperature variation from present levels up to a defined level beyond X, it is irrational to spend any more than the cost of Y.

This argument implies that if industrial nations expect additional emissions in China, or elsewhere in the Third World, will reach certain levels, they may decide that adaptation strategies are their best option. They may attribute the expected emissions growth to domestic political opposition into new environmental obligations or to the enactment of ineffective controls in

63. See Collin Green et al., *Energy Module*, in RAINS-ASIA: AN ASSESSMENT MODEL FOR AIR POLLUTION IN ASIA, at III-1 (Wes Foell et al. eds., 1995); VACLAV SMIL, *ENERGY IN CHINA'S MODERNIZATION: ADVANCES AND LIMITATIONS* (1988); Vaclav Smil, *Energy and the Environment Issues for APEC: Why China Matters Most* (Oct. 31, 1995) (unpublished paper, on file with author); *GEF China Report*, *supra* note 7, at 16-55.

developing nations.⁶⁴ Whatever the cause, either an unwillingness or an inability to control GHG emissions that results in the installation of an emissions-intensive capital base that will depreciate over an extended period, may undermine the logic of the case for mitigation. An effective international regime must implement collective action to induce or require investment in an alternative energy-transportation infrastructure, with lower emissions potential before the pursuit of business as usual springs the China Trap.

The China Trap suggests that the negotiation of a multilateral regime for climate change demands both agreement on mitigation options, whose total costs are less than forecast adaptation costs, and commitment to the regime. The agreement and the commitment must succeed in time to shift the behavior of key growing economies, from emissions-heavy to emissions-reducing development paths. The regime design would have to include national reductions in emissions or emission growth rates in all major emitting states, transfer payments necessary to induce this widespread participation, and assurance to contributor states that their financial transfers will actually result in mitigation. The contingencies in China (and other countries in transition) about the effective reach of the legal system, the bureaucratic rivalries that impose political risk on projects that rely on a stable regulatory environment, and the deeply embedded North-South conflicts over the equities of international regimes, militate against this third condition. Uncertainties about

64. China has led the political opposition to JI in the G-77 bloc. This initiative in the FCCC forum seems rooted in a broader Chinese international agenda that emphasizes China's role as a major power, prepared to jibe at the West across a range of issues, register, as a standard bearer, the historical claims of the developing world, and stress the security concerns of China as a sovereign actor resistant to Western intrusions. Although the militancy of the international stance may belie more divided politics at home, the possibility that opposition may persist will make subscription by other nations to a mitigation regime risky. In addition, it is not clear that China could adhere to effective commitments on GHG emissions constraints. Current patterns of energy development are based heavily on coal powered plants which are often at a sub-optimal scale and are operated by local enterprises or municipalities, with limited access to capital markets, and free of environmental controls. Incentives to alter these patterns are weak at present. See LESTER ROSS, ENVIRONMENTAL POLICY IN CHINA 130-75 (1988); SMIL, *supra* note 26, at 99-137.

JI investment by Western energy companies would present problems of security of return, continuing uncertainties about subsidies and energy price reforms, and assertions of sovereign limits on the monitoring of contractual commitments. Legal enforcement of these contracts is also problematic. On the other hand, China is aware of massive capital needs for energy and transportation infrastructure, and increasingly concerned about domestic pollution from sulfates and nitrates produced by fossil fuels. There are large stocks of JI opportunities in energy efficiency and clean coal upgrading that promise long term benefits from improved infrastructure. Japan, and Korea, in particular, have associated interests in energy sector JI to reduce vulnerability to acid rain. Whether these considerations will countervail Chinese diplomatic resistance to JI, or alleviate the general problems of capital intensive foreign investment in China, remains an open question which must be resolved rapidly.

time windows, and their implications for potential mitigation solutions, may only add to the forces pushing toward adaptation as a default case. The argument portends that neither the FCCC negotiations nor alternative processes should count on the luxury of deferral in developing a mitigation regime.

V. CONCLUSIONS AND PROSPECTUS

The discussion of joint implementation in this paper should be understood in the context of the disenchantment with orthodox instruments of regulation and the emergent quest to design and develop economic instruments adequate to address the collective action problems posed by global climate change. The orthodox view has been that these problems will best be solved through multilateral negotiations, aimed at a comprehensive mitigation regime for GHGs, that designs and implements a cap and trade system.

My argument is that JI is better seen as an escape path from the disabilities of the diplomatic forum, which relies on competitive trading to define the environmental obligations of different nations in a climate change regime. This argument is outlined in the following propositions:

- (1) The aim of an international regime for climate change is to develop economic instruments that encourage and permit actors to be efficient and innovative in internalizing environmental costs.
- (2) The establishment of property rights to emit carbon and carbon-equivalent gases and a comprehensive global trading market in those rights is one important means of achieving this goal.
- (3) The most problematic aspect of establishing a property rights-based system is the allocation (initial assignment) of rights. This process is exceptionally problematic because of three inter-related difficulties: demand revelation in uncertainty, dual shift, and limited time windows. These difficulties add up to pervasive uncertainties about the relative costs of mitigation and adaptation, and a systematic tendency to incorrectly estimate and disguise negotiation positions.

(4) The nations involved in the multilateral negotiations in the post-Rio diplomatic forum have been able to agree on a soft partial allocation formula only among the developed nations.

(5) The nations participating in multilateral negotiations have been unable to agreed on a global formula for rights assignment. The principal reasons for skepticism about forum specific problems in braking free of negotiation deadlock are related to the culture of diplomacy, which favors national and regulatory over private and market mechanisms; the privileged place of international law and consensual decision rules in the diplomatic forum; the historical embeddedness of North-South blocs with conflicting analytical heuristics to interpret political obligations; and the concern of diplomats to establish reputation effects in a wider agenda of security, trade and other international concerns. These concerns often take precedence over the importance of environmental issues.⁶⁵

(6) If political authorities continue to be unable to agree upon a global allocation of emission rights, the development of the international regime first requires the development of a functional substitute for them.

(7) If the direct multilateral route to a global regime is blocked, the substitute determination of allocations must be pursued indirectly on a multi-local (unilateral, bilateral, minilateral, or regional) basis.

(8) Joint implementation can be understood as the most practical forum in which to develop such a multi-local process for setting the allocations of emissions rights (JI baselines).

(9) Joint implementation is an imperfect and partial step toward a global trading system, that has important economic similarities to, and differences from, a comprehensive regime based on a deep market in tradable permits. JI does not, however, require agreement on universal allocations of rights to begin operating. However, it does require key developed (GHG buyer) nations to acceptance some obligations to

65. The arguments that the character of the diplomatic forum magnifies, rather than lessens, the difficulties of establishing a climate change regime have been developed elsewhere. *See supra* notes 17, 18, and 59.

mitigate. It also requires the initiation of a market into which key (GHG seller) nations may bid for shares of investment funds, qualified by their mitigation effects on GHG emissions.

(10) For the joint implementation process to evolve toward a comprehensive regime, the process of creating allocations multi-locally cannot be blocked by those same multilateral institutions unable to agree directly on an allocation formula; multilateral negotiations should not regulate or otherwise substantially restrict the global market for JI projects.

(11) For joint implementation to develop along the proper path, the home jurisdictions of investors in JI projects must establish effective national incentives (environmental assets and liabilities) for private actors to undertake appropriate action and set the rules and baselines for project qualification. Although defining the criteria for JI project qualification poses difficult analytical problems,⁶⁶ the volume of qualified capital flows approved by the qualification process can provide material evidence about the actual demand price these GHG buyer nations are willing to pay for GHG mitigation.

(12) For joint implementation to so evolve, the host nations of JI investment must individually decide whether they wish to participate in this international market and, if they do, assimilate JI projects to their general regimes for foreign investment. Again, in theory, the willingness of less developed nations to bid (by means of bilateral and other agreements to maintain or enhance environmental quality in their nations) in a competitive market for JI capital flows is a revelation of the supply price of GHG mitigation. Through trading under appropriate qualification processes, buyers and sellers, in effect, negotiate multi-locally JI baselines which are the functional equivalents of national emissions caps. The allocation of national emission caps, the allocation of which is now stalled in the FCCC negotiations.

(13) JI projects should be rated as better qualified when they are located in nations which enter into bilateral or mini-lateral agreements committing

66. See *supra* notes 8 and 46.

them to environmental standards or other policies related to GHG emissions, such as energy pricing reforms. Competitive markets for favorable JI investment ratings can lead to rising environmental baselines in a process of decentralized negotiations.

(14) The dynamics of the JI game are complex and will demand coordination among leading buyer nations to prevent the articulation of loose qualification rules that result in a race to the bottom--incentives to seller nations to lower environmental quality in order to have more emissions reduction projects to market through JI--and a trade war that produces a general deterioration of global environmental quality. This coordination is only possible, however, in markets with a small number of players able to monitor each other's behavior.

(15) A successfully designed, indirect JI regime will result in an expanding number of nations seeking to join the game in order to gain a share of the revealed demand for mitigation. In the end, such a market can lead to agreement on acceptable levels of mitigation costs and transfers, now hidden by strategic political behavior, which will eventuate in the celebration of a comprehensive multilateral regime as the last, rather than the first, step in building international institutions.

The dynamics outlined in points 11-15 will require detailed explication elsewhere if JI is to be seriously explored as an indirect road to a comprehensive climate change regime. Still, there can be no assurance that this is the only outcome of the realpolitik game or that it can be played out quickly enough to prevent tipping the system to adaptation. At the least, competition between multi-local and multilateral institutions over which system will dominate the political economy of climate change may push us away from the current torpor that can only lead to default.